

PULP & PAPER

Presents Its— 1948 NORTH AMERICAN REVIEW NUMBER

Our Cover Picture—

• seemed to be a fitting "keynote" picture for this year's North American Review Number. The theme of this year's book is "More Fibers for Pulp and Paper."

The picture shows a stack of wood in the wood yard of The Mead Corporation at Chillicothe, Ohio. There are several species of wood in the stack, including some less common pulpwoods mentioned in our article which begins on the next page.

Incidentally, Mead started up in March a new 3-stage soda pulp bleach plant at Chillicothe which will permit it to use various species of wood which could not have been used before.

The search for supplementary fiber resources and, more important, the accomplishments in making more complete use of wood fibers, seemed to be a timely theme for this year's Review Number.

Our readers will recall that each year we have selected a subject of transcendent importance to this industry for this issue. Our editors, working in the field in every section of the continent, then spent several months marshalling all the pertinent information available on what was actually being done in regard to that selected subject.

Last year, the Review Number theme was "Engineering Advancement." The year before it was "Labor Relations." In 1945 it was "Wood Resources."

In regard to the material we have gathered for this issue on the search for more fibers and for better ways of utilizing fibers, it

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may be well to remember that probably for as long as we can foresee, wood will be the dominant fiber source. More wood fiber can still be grown in a given area than any other kind. But supplementary fibers and "fillers" will be increasingly important and there is no doubt that the time is coming when the utmost economic value will be gotten out of every piece of wood to the very tree tops and tips of branches.

This North American Review Number has been often called the most complete reference book on this industry published anywhere. We are indebted to industry associations and government agencies for much of the material. But, also, a great deal of this material and the interpretation of trends in the industry are the result of numerous personal interviews with active leaders of this industry and from personal observations by our editors in the course of extensive traveling to pulp and paper operations in every corner of the North American continent by our staff of field editors. Even Mexico was brought into their orbit this year.

This is the only statistical and review publication of the pulp and paper industry which is prepared in this manner. We hope you find it both interesting and useful.

Some 500 towns in 36 states produce the 21,000,000 tons annual production of paper in the U. S., and more than half of these towns have less than 10,000 population. In such communities more of the real "luxuries" of living are available than there are in big, crowded cities.

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FIBROUS MATERIALS

How the Supply Is Being Increased

FIBROUS MATERIALS CONSUMED BY U. S. MILLS IN 1947

	Tons
Wood pulp	13,872,000
Other fibrous materials	9,323,637
Waste paper	7,844,968
Straw	523,466
Rags	453,102
Flax	66,386
Manila stock	10,071
Miscellaneous fiber	425,644

Source: Wood pulp, by U. S. Pulp producers Assoc., other fibrous materials, by U. S. Census Bureau.

MANY pulp and paper companies, research laboratories and manufacturers of equipment are hard at work on projects which they hope will make more fibers available for pulp and paper.

There are several ways in which this objective is being achieved. Much has already been accomplished. In the past two or three years there have been significant changes in the industry. The trends resulting from these changes undoubtedly will continue in the future.

In the past several months, editors of **PULP & PAPER** in every region of the continent have made an effort to gather together for this article some of the significant news regarding these trends. As a result of their travels and interviews they concluded that the ways in which fibers are made more plentiful may be broken down into these divisions:

1. The increasing uses of hardwoods for everything from book paper to paperboards and the general substitution of wood species which is occurring in all parts of North America.

2. Salvaging of wood residue or "left-overs" in logging areas and sawmills formerly uneconomical to use in pulp manufacturing.

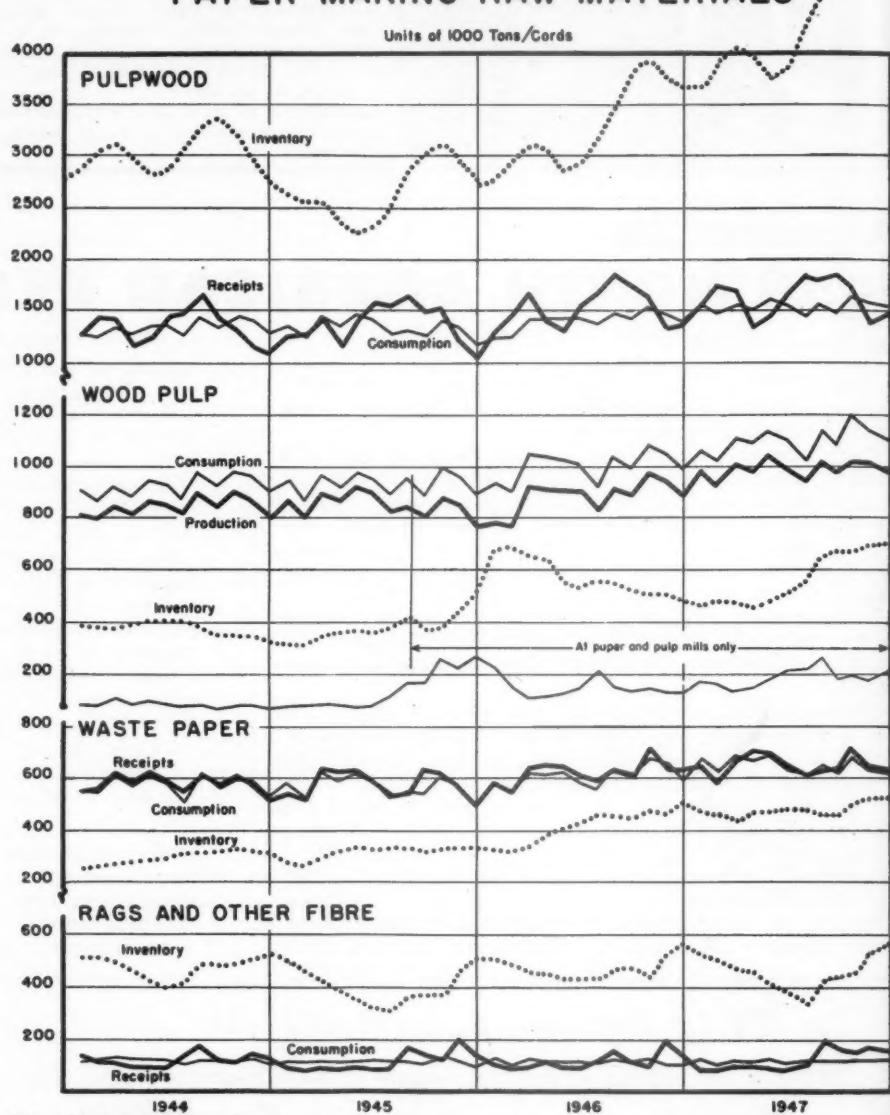
3. Possibilities for greater uses of agricultural residues and fibers, especially for a wider range of papers and boards than at present. Wheat straw, bagasse, flax, cotton stalk, bamboo and other fibrous materials are subjects of study.

4. Waste paper and rags reprocessing, which is being improved in many ways, bringing higher recovery yields. There are new de-inking and new de-resinizing processes. But the problems are also increasing with development of new types of inks, and greater use of resins in paper and of synthetic fibers in rags.

5. Development of new equipment such as pulpers, defibrators, refiners, save-alls, fiber reclaimers and of semi-chemical and other new pulping processes all of which are successful in producing greater yields of pulp from fiber and also greater recovery and re-use of fibers. They are broadening the range of raw materials available to the industry.

6. The uses of non-fibrous materials

PAPER-MAKING RAW MATERIALS



(Chart by U. S. Commerce Dept.)

such as clays, starches, resins, earth fillers, resins, etc., which are making it possible to extend the use of available fibers. Research is directed toward increasing the ratio of filler to fiber. About a one-third saving in fiber is achieved in coated paper mills.

HARDWOODS

Let us first take a look at hardwoods — and of substitution of wood species. Hardwoods are plentiful—to the point of being a pest—east of the Mississippi, in both North and South. In the west, a prominent research executive says there is not enough hardwood to provide what would be needed for a blending pulp. But considerable use is

being made of softwood species never used before.

A top technical executive of one big fine paper producer in the Midwest said it will be two or three years before his company knows how hardwoods will fit into their program and products. Several Midwest mills are making considerable use, however, of hardwoods as an extender.

The technical director of another company producing high quality papers told **PULP & PAPER**:

"Along with other mills in this area we have made extensive use of poplar in our groundwood mills. We have, over extended periods of time, used nothing but poplar in our grinders. By running a dull stone, a pulp of suitable fineness for high grade



D. H. GREENE (left), Pres. and Gen. Mgr., and R. J. SUSS (right), Sec'y and Res. Mgr., of Otsego Falls Paper Mills, Otsego Falls, Mich., a mill which recently became a 100% user of hardwoods grown in Michigan.

book papers is produced but the power requirement for a pulp of this type is extremely high. The strength is also inferior to that of spruce ground with normal power. The pitch or gum in the wood causes some trouble and the brightness deteriorates badly as the wood ages. However, it is a comparatively easy pulp to bleach either with peroxide or hypochlorite. There is no doubt but that poplar can and will be widely used for groundwood for the highest quality groundwood book papers.

"What the Forest Products Laboratory in Madison, Wis., says on the potential use of bleached neutral sulfite semichemical pulp made from poplar in a mixed furnish for book paper has, in large part, been verified in commercial runs. This pulp is too short fibered to completely displace long fibered sulfite in book papers, but it does make possible substantial reduction in the amount of long fibered pulp necessary to hold the sheet together. As the long fiber supply becomes more critical we may expect to see production of this type of hardwood pulp used as partial replacement."

An executive of a research laboratory, whose unusual position made it possible for him to appraise the relative importance of the hardwood trends, summarized their importance as follows for **PULP & PAPER**:

"As softwoods become more expensive, mills making groundwood, soda, sulfate, and sulfite pulps increase their consumption of hardwoods. Surveys of sulfate wood growth and wood balance in many areas have demonstrated that in the past the industry has been cutting softwoods at a ratio and a rate that is not in line with the existing balance of softwoods and hardwoods. Generally speaking, the hardwoods are lower in cost from a stumpage standpoint and are shipped from areas closely adjacent to the pulp mill. In many cases the hardwoods have the advantage of higher weight per cubic foot over the softwoods. There is the further fact that in many instances hardwoods can be obtained by truck as so-called 'farmer-wood' during the winter months when other farm activities are in abeyance. This trend toward hardwoods was manifested originally in some

of the 'lower grades.' It has been demonstrated, however, that these species can be used in significant percentages in the higher grades.

"One interesting trend that has manifested itself quite recently is the manufacture of nine-point corrugating medium from hardwoods, either by the neutral sulfite process, the Asplund process, or by one of the semi-chemical processes. This trend is of particular interest in the South where there are various species of oak and gum woods."

According to recent experiments made at the U. S. Forest Products Laboratory, in the production of base stock for coated book paper, a total of as much as 30% of aspen semichemical and groundwood pulps may be used without significant sacrifice in quality of paper or materially changing the papermaking operations. It was found that the aspen semichemical pulp provided the necessary strength, and when used with a free aspen groundwood, satisfactory stock freeness and absorbency in the sheet were obtained. Coating, supercalendering, and printing trials were made with satisfactory results.

Under G. H. Chidester, chief of the division of pulp and paper at the Madison Laboratory, considerable work has been done on hardwoods and here is a summary of some of the results:

Madison Experiments

In experiments on groundwood pulping of hardwoods, the U. S. Forest Products lab at Madison, Wis., found that pulps prepared from quaking aspen, yellow-poplar, Eastern cottonwood, and black willow, were moderate in strength and of good color with the exception of the cottonwood and willow which were somewhat darker. When pulped under the same conditions, aspen grinds much faster than spruce and consumes less energy per ton, but the aspen pulp has lower strength and higher freeness. Experiments have shown that this high freeness groundwood is suitable for blending with lower freeness aspen neutral sulfite semichemical pulp for the production of machine-coated groundwood book paper. Promising results were obtained in furnishes containing as much as 50% of the groundwood and 30% of the semichemical pulps.

Groundwood pulps prepared from the higher-density hardwoods ranged in strength from low, for swamp tupelo, white ash, sweetgum, and paper birch, to fair for sugar maple, black tupelo, sugarberry, American elm, and green ash. The colors of the ash, tupelo, and sugarberry pulp were good, that from the paper birch was slightly darker and those from the maple, elm, and sweetgum were fairly dark. Most of the pulps responded well to bleaching. All were suitable for filler stocks in printing and specialty papers, according to the laboratories. Satisfactory quality newsprint paper has been made experimentally with some of them in mixture with softwood groundwood and hardwood semichemical pulps.

On "Bleaching of Hardwood Groundwood Pulp":

A comparison made of the response of representative hardwood and softwood groundwood pulps to bleaching with sodium peroxide and with hypochlorites indicated that the hardwood pulps are the more amenable to bleaching. It appears that hardwood groundwood pulps can, in general, be brought to the brightness range of 70 to 75 with a proper selection of the bleaching treatment. Softwood pulps apparently fall in a somewhat lower bleached-brightness range, particularly when hypochlorite is used, although some spruce pulps and possibly others are exceptions.

It was shown that bleaching with hypochlorites is most favorable when the rate of



COMBINED LOCKS PAPER CO., Combined Locks, Wis., has long been a pioneer in the salvaging of papermaking fibers by development of de-linking processes discussed in this article. This picture taken at Combined Locks by **PULP & PAPER** shows C. M. G. CARROLL (left), Purchasing Agent and Traffic Mgr., and G. D. MUGGLETON (right), Vice President and General Manager.

reaction is slow, particularly during the first few moments when, as is well-known, the consumption of chlorine is ordinarily very rapid. Reaction rate can be retarded by use of a low density, a moderate temperature, and a high initial alkalinity of the order of pH 11 to 11.5. The addition of sulfur dioxide at the end of the bleach to destroy residual alkali will obviate washing the pulp. If acidification is continued to pH 5, as is done in peroxide bleaching, an additional gain of brightness will result in some instances.

The brightness of groundwood pulps when bleached with hypochlorites is less stable than when bleached with sodium peroxide. With respect to hue, groundwood pulps will often develop more yellowness upon bleaching with hypochlorites than with sodium peroxide. However, it appears that the yellow hue can be compensated for with conventional dyes without a significant decrease in brightness.

In bleaching of hardwood neutral sulfite semichemical pulp, the strengths approaching those of some conventional softwood pulps can be obtained in yields of 60% or more based on the wood.

In the bleaching of these pulps the use requirements of the bleached pulp will determine the degree of pulping needed and the type of bleaching process to use. For example, if a brightness of not over 75 is adequate the unbleached pulp may be prepared in yields up to 80% based on the wood and the bleaching done in a single-stage with hypochlorite or possibly sodium peroxide. The initial strength should be good, however, since a slight loss in strength often results with one-stage bleaching treatments. If a high brightness, a large increase in strength, or both are required in the bleached pulp a multi-stage chlorination-caustic soda extraction-hypochlorite oxidation bleaching process should be used. When this type of bleaching is used the lignin content of the unbleached pulp should be not more than 11 per cent for the chlorine demand to be within practical limits. A generalization that can be made with respect to the preparation of semichemical pulp for bleaching is that the conditions of fiberization should be such as to accomplish the maximum resolution of shives compatible with the highest possible freeness.

"Corrugating Board from Hardwood High-yield Sulfite Pulp" was the subject of another project at the Madison laboratory.

Hardwoods of widely different physical and chemical characteristics, including black willow, Eastern cottonwood, American elm, sugarberry, green ash, bitter pecan, and blackjack oak were converted to pulps by a sulfate semichemical process in which only about one-half of the total chemicals, at about half the concentration, as commonly employed, were used. The partially cooked chips obtained were satisfactorily



HERE IS PHOTO TAKEN BY PULP & PAPER of the hardwood stack in the yard of Otsego Falls Paper Mills, Otsego Falls, Mich., the only all-hardwood mill in that part of the country.

fiberized and refined, giving pulps of high yield suitable for making into corrugating board. The pulps obtained from the less-dense hardwoods had considerably higher strength properties than that made from Southern yellow pine pulped under similar conditions. The experimental corrugating boards made from these hardwoods compared favorably with commercial pine groundwood, chestnut chip, and straw corrugating boards.

Board for Mixed Woods

Experiments at the Forest Products Laboratory and mill-scale trials have indicated the possibility of producing liner boards meeting commercial specifications and use requirements from jack pine semichemical pulp and mixtures of jack pine and aspen semichemical pulps.

In the experiments, jack pine was pulped with sulfate and neutral sulfite liquors to produce pulps in yields of approximately 50 to 80 per cent and several hardwoods, including aspen, were pulped to yields of 70 to 80 per cent.

The liner boards made from the lowest yield sulfate and neutral sulfite pulp had strength properties equal or exceeding those of commercial southern kraft liner boards tested for comparison. The liner board from the jack pine neutral sulfite semichemical pulp made in the highest yield (78 per cent) was equal or higher in bursting and tensile strength but lower in tearing strength and folding endurance than the commercial kraft board. The experimental board from a 50-50 mixture of jack pine and aspen semichemical pulps (also 78 per cent yield) was equal to the commercial kraft board in bursting and tensile strengths but was lower in tearing strength and folding endurance.

Tests on corrugated fiberboards made in the mill trials from the jack pine and the jack pine-aspen liner boards and a straw corrugating medium showed the semichemical boards to be higher in bursting strength, somewhat lower in tearing strength, and slightly lower in puncture and score-line resistance than a commercial kraft fiberboard. An improvement in strength was obtained by replacing the straw corrugated board with one made of aspen semichemical corrugating board.

Experimental liner boards from neutral sulfite semichemical pulp from aspen, birch, eucalyptus, and a mixture of beech, cherry, and maple approached the commercial kraft board in bursting strength, equaled or exceeded it in tensile strengths, were considerably lower in tearing strength and folding endurance, and had higher stiffness values.

Use in Northeast

The development of the use of hardwoods was progressing at a fair pace before World War II, but during the con-

flict there was some delay in its progress. Somewhat typical, for example, was the procedure at the Deferiet, N. Y., mill of St. Regis Paper Co. Prior to the war they were cooking poplar, beech, birch and maple in considerable quantities by the sulfite process and the fibers were bleached before use in the paper furnish. In some cases the hardwood fibers constituted 30% of the furnish, the balance being approximately 40% groundwood and 30% spruce sulfite.

During the war, however, wood became so short that all Deferiet efforts were directed toward obtaining adequate amounts of coniferous woods and the trend was toward higher percentages of groundwood in the furnish so as to get the maximum amount of fiber per cord. Since the war's end, Deferiet has been working on new grades and in order to reduce the variables to a large extent, the introduction of hardwood into the furnish has been avoided. It seems logical, however, that at some future date Deferiet will again go into hardwood use—as will many another mill.

St. Regis, among others, is a member of a group of mills which has contributed various sums of money to underwrite certain research facilities at the New York College of Forestry for a two-year period. This work is under the direction of Prof. C. E. Libbey, and when **PULP & PAPER** visited there he indicated that results had been encouraging.

Russell I. George, superintendent of the Mechanicville mill of West Virginia Pulp and Paper Co., has had, according to E. W. Littlefield, superintendent of Forest Investigation, Conservation Department of the State of New York, "more real experience with the commercial use of hardwoods than any other operator in New York State."

New York State offers an interesting laboratory, because it was forced early into the use of hardwoods by economic pressures. It is still the largest paper producing state, yet in the last 25 years it has lost about half its pulp producing

capacity. She uses two classes of hardwoods—"popple," which has been used by papermakers for a long time and refers principally to quaking aspen and bigtooth aspen. In New York State fifteen mills now use popple, and ten of these expect to use 1,000 cords or more by the soda process. Three biggest consumers are International Paper, North Tonawanda, New York & Pennsylvania Co., Willsboro; and West Virginia Pulp & Paper at Mechanicville. Six mills use northern hardwood and all six expect to consume more than 1,000 cords. Three largest consumers in this class will be Certain-teed Products Co., Niagara Falls; International Paper Co., Ticonderoga; and West Virginia Pulp & Paper Company, Mechanicville. The northern hardwood is reduced by either soda, sulfate or the Asplund process. According to most recent statistics, popple will supply about 16% of the total pulp production in the state, and mixed northern hardwoods a little less than 6%.

Dr. Robert S. Aries, adjunct professor at Polytechnic Institute of Brooklyn, says a pulp mill near New York City was now a commercial possibility due to a pulping method which opens untapped oak-hickory area within 300 miles of Manhattan. It is reported that two near-New York mills are being planned for 600 tons a day each. It is interesting to contemplate that such mills would avoid rail differential with many other mills to vast New York and southern New England markets.

The extensive oak-hickory area embraces southern Massachusetts, Rhode Island, Connecticut and southern New York. Dr. Aries claims that "the Polytechnic process opens up the southern New England area." The treatment consists of cooking with soda ash and sulfur dioxide following by attrition mill treatment. Its proponents claim that the method, since it involves only a mild chemical treatment, results in a much higher yield of pulp than conventional methods. Pulp yields as high as 75% are contemplated. It is also claimed that the new process lends well to bleaching and conversion into high quality rayon and plastics.

Heavily dependent on imports of spruce from northern New England and Canada, New York State has naturally been alert to hardwood possibilities. Recently the Conservation Department queried thirty-three New York State mills as to their wood requirements for 1948. Summary of the results showed 25 mills making groundwood, nine on sulfite pulp, three on soda pulp, one on sulfate and two defibrator pulp. This year the pulp mills will buy and use about 939,700 cords. Seventy-one per cent will be spruce and balsam. Next is popple which comes in on the uplands after heavy cutting or fire. A small quantity of cottonwood from the flats along the Hudson below Albany is included. Hemlock (two-thirds of which will be purchased with the bark on) accounts for 54,100 cords. The Northern hardwoods will amount to about 54,500 cords, still a relatively small amount despite the vast work done on research. Only two mills will use white pine which

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was used in greater quantity during the war. Its use has been discontinued now by the mill which was its biggest consumer.

The New York State Conservation Department is looking more toward long term restoration of the forests than to the development of hardwoods, naturally enough. They report, in fact, that "we must begin the painful process of reversing Nature's trend to hardwoods; good softwood land now occupied by weeds must be reclaimed for spruce and balsam. But this is a long term process." Meanwhile the Conservation Department is mindful that the pulp industry cannot wait, and that the changes in process must go on developing for the use of hard-woods. The Conservation Department is continuing to plant sizable quantities of trees which will yield long-fibered wood, and in the future it is to try to plant also Japanese and European larch "which seem to offer promise of rapid production of high quality pulp-wood."

In the South

In the South, the place of hardwoods in raw materials supply for the paper industry has not been fully determined. But enough has been learned to know that it is not an extender in the South—to be mixed with pine—but to be handled as a different product. The largest use to date of hardwoods has been as corrugator

for box board. It is produced in Georgetown, S. C., and Bastrop, La., in substantial quality.

Study of the wide varieties of Southern hardwoods has resulted in singling out of some for special uses. Tupelo gum is used for grease proof stock, for one.

It is believed hardwoods will be widely used in pulping in Southern mills within a relatively short time. The greatest economic factor behind this drive is that large forest land holdings were acquired principally for their value in pine production. These pine stands are interspersed with hardwood bottoms. The use of the hardwoods on a basis even nearly proportional to their availability will result in lowering the average investment cost with equivalent reduction in stumpage ownership overhead.

At the Herty Foundation Laboratory, Savannah, Georgia, there has been no recent work on hardwoods so far as white paper is concerned, but a considerable project is under way on semi-chemical pulp for liner medium and corrugated board which shows very high yields and physical strength, according to Walter L. Hendrix, director.

But long before World War II the grinding of certain southern hardwoods has been a field of investigation. Swamp black gum and cottonwood mechanical pulps have very good color, often 60 to

65 brightness. Other hardwoods have proven less significant because of either inferior colored pulps or limited supply. Black gum and cottonwood mechanical pulps are weaker than similar coniferous pulps. But swamp black gum groundwoods have been produced with as little expenditure of power as 500 kwh per ton, and pulps of this power have been used successfully in book, magazine, and news grades where the deficiency in ground-wood strength has been compensated by the use of strong bleached sulfate pulps.

In addition to its 500,000,000 cords of pine, the South's forest resources embrace an equal amount of hardwoods, about half of which are so-called pulping hardwoods. And at least for the purposes of research we can list these usable species as black and tupelo gums, red gum, cottonwood, yellow poplar, willow, bay, and soft maple.

Researchers of the National Bureau of Standards, Washington, D. C., claim to have developed a new technique—using plastic bonding material to strengthen the paper—which "may increase by as much as 75% the use of deciduous species such as maple, birch, beech maple, and poplar." The bureau claims the new paper absorbs ink better and has less tendency to curl than other grades. According to the announcement, this paper is for government printing use.

ALL-HARDWOOD MILL IN MICHIGAN

Most prolific woods now growing in the Kalamazoo Valley region of Michigan are the hardwoods species. The softwoods in Michigan have largely disappeared along with the lumber industry and the fact that a paper industry sprang up in its stead in this great state had little to do with timber supply or even rivers, but rather with paper markets and the inclinations of its leaders. But there are hardwoods, and an abundance of them, both in and around the Allegan National Forest of Michigan.

This is near Kalamazoo and especially handy to the Otsego Falls Paper Mills, Inc., which is located about 15 miles north of Kalamazoo. Today the Otsego Falls Paper Mills, which used to use straw in the manufacture of paperboard, is a hardwood using mill entirely—the only mill which is virtually entirely on hardwoods in the Lake States region or that region of the Middle West.

What has made this possible are the new semi-chemical and attrition pulping processes which have been developed in recent years, bringing forward new kinds of pulpmaking machinery, and giving this industry a chance to greatly broaden its sources of fiber supply.

Perhaps the most significant development in the industry today throughout the Middle West and the Northeast is the new uses being made of hardwoods—giving those prolific species of wood a new economic value. Although it is true that some hardwood is suitable for lumber, a lot of it has had virtually no economic value,

being used, if at all, for fuel. Some of it can even be used today—and is being used—by these Lake States mills and eastern mills for fine papers and book papers, mixed with the softwoods.

But at Otsego Falls Paper Mills is an interesting operation which has gone over almost entirely to hardwoods. The product is a type of paperboard or pulpboard in strong demand today, which is building board or saturating board.

There are many years' supply of hardwoods in close proximity to the town of Otsego, where this mill is located, we are told. Farmers in the vicinity have a chance to produce a new cash crop, supplying the mill with birch, beech, maple, oak and cherry. Poplar and aspen can also be utilized in the processes at this mill.

It is a novel sight to most paper industry people to drive up to this mill and see extensive stacks of hardwoods of all sizes, from four inches up to 13 inches, and the shape doesn't matter either. The bark is a dark color. In this product even the bark is used and the result is that up to 75 to 80 per cent yield is obtained.

A major remodeling and reconditioning program, along with installation of new equipment, was carried out at Otsego Falls Paper Mills before the former straw mill could be converted to the new method of pulp manufacture. The flow of operation now is as follows:

Wood in 8-ft. lengths and up to 14 inches diameter is reduced to chips. The chips are cooked by semi-chemical process in a series of five 6-ton rotary di-

gesters supplied by Biggs Boiler Works. Then comes the "attrition" type pulping process, with the fibers further broken down by being passed through a series of two Bauer Bros. Pulpers and four Sprout-Waldron machines.

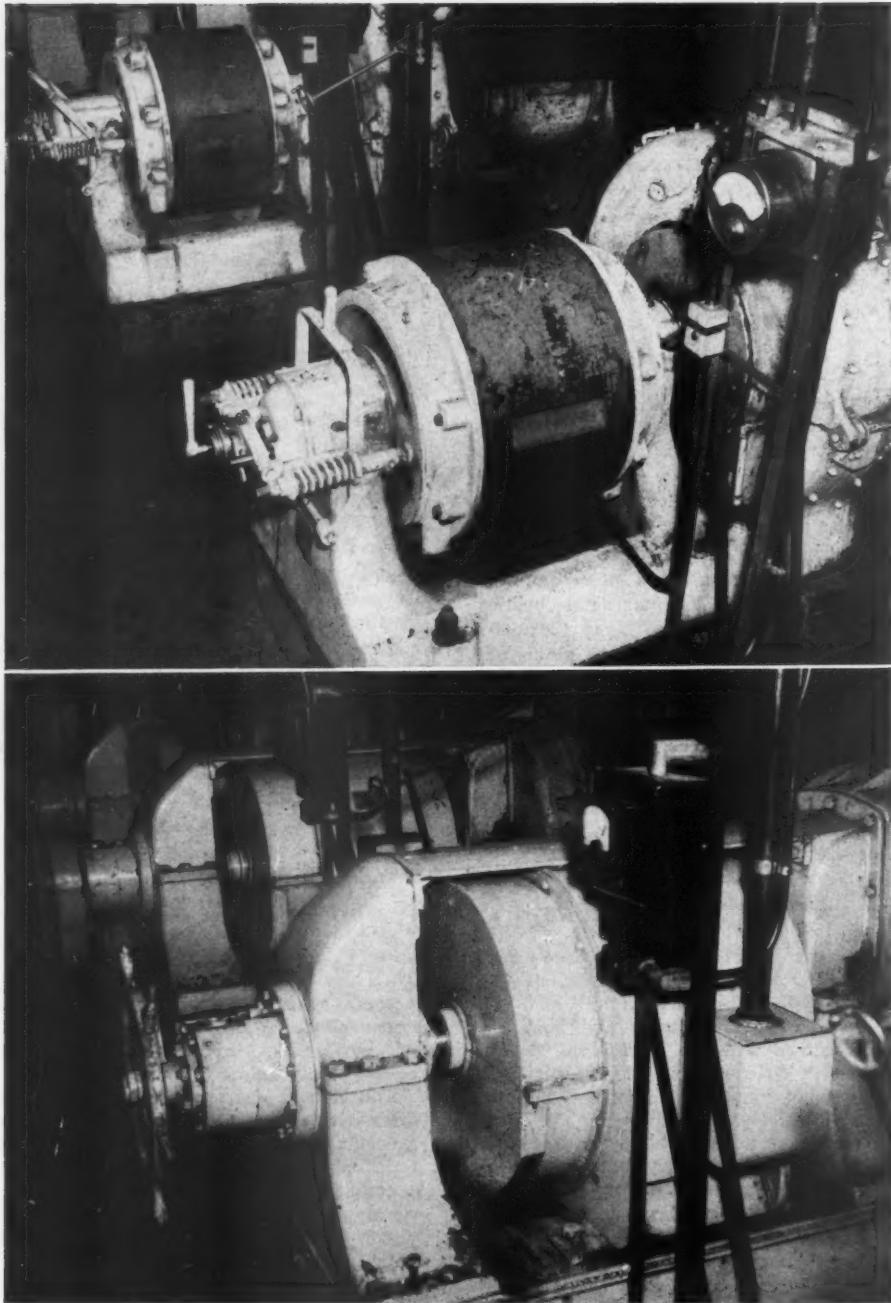
The Bauers operate as double rotating discs with corrugated disc surfaces, made according to the design of corrugation especially desired by the mill. There is no pressure used and hot water is used, instead of steam. The temperature of the water and the quantity of chips fed per hour governs freeness of pulp product. In passing through the Sprout-Waldrons, the fibers are broken down by a rotating disc operating against a stationary disc, instead by two revolving discs as in the Bauers.

According to the top executives at the Otsego Falls mills, the Bauers and Sprout-Waldrons do a highly satisfactory job of refining the semi-chemically cooked fibers. All of these refining machines are parallel and all are fed from one conveyor leading from the rotary digesters. It is a continuous feed system.

From steel bottom pits under the rotary digesters, a bucket elevator and screw conveyor provide the continuous system, with overage of chips from the refiners going back to the screw pits to be again fed as needed into the refiners.

There are two 150-h.p. General Electric motors driving each Bauer, and there is a 300-h.p. Westinghouse motor driving each of the four Sprout-Waldrons.

From these machines the pulp is held



EQUIPMENT USED AT OTSEGO FALLS MILL IN PREPARATION OF HARDWOODS photographed by PULP & PAPER. Upper: Two Bauer Bros. Pulpers, one in foreground with clutch in position to operate; the one in background has clutch thrown out. Lower: Sprout-Waldron refining machine.

in suspension in 95% water until needed. It is then passed through Emerson jordans and from the Emersons to machine chests and then to the two Fourdrinier paper machines on which the board products are made. These machines have been modernized.

Daily production of these two machines is 80 tons of board. To produce this much, approximately 80 cords of hardwoods are utilized.

The machines are 110 and 84-inch Fourdriniers, trimming 102 and 77 inches. Products are .009 corrugating board, saturating board, asphalt board, semi-chemical woodpulp board and special asphalt paper and board.

Variations of this process are being applied in other mills over the continent as a means of utilizing less common woods or sawmill trim and wood formerly used as fuel because it was unsuitable to the older orthodox pulping processes.

Actually, a forerunner of the Otsego Falls operation was first developed by the Mead Corp. at its Knoxville, Tennessee, plant, with the cooperation and assistance of the Forest Products Laboratory at Madison, Wis., as a means of utilizing exhausted chestnut chips in the tanning industry.

D. H. Greene, of Kalamazoo, is the president and general manager of Otsego Falls Paper Mills, Inc. Mr. Greene formerly was in business in Joliet, Ill., and prior

to that he operated the Wisconsin Tissue Mills in Menasha, Wis.

R. J. Suess is secretary and resident manager. Mr. Suess has been at Otsego Falls for six years, prior to that being at a Durham, N. C., box plant. He was originally a Wisconsinite, too.

Chief assistant to Mr. Suess is Seb Stiefes, general superintendent, who came from the Institute of Paper Chemistry at Appleton, Wis.

The present company was organized in 1935, the mill having been purchased from Allied Paper Mills of Kalamazoo, which company still has a coating mill in Otsego, just a few blocks away from the Otsego Falls Paper Mills. Before being sold by Allied, the Otsego Falls Paper Mills were known as Allied's Bardeen Mill No. 1. Early in its history this mill turned out a fine quality of book paper. But precarious dependence on the availability of quality pulps from outside sources no longer exists, as the wealth of hardwoods, and quality and usefulness of its present products assures it a bright and stable future.

The development of its present process has created an additional 60 jobs for the little town of Otsego and its immediate vicinity. This has brought total payroll at this mill to 150 persons.

Associated with Mr. Greene as officers of the company are two residents of Menasha, Wis. They are D. G. Turner, vice president, and Mory Smith, treasurer.

SALVAGED WOOD

The major hardwood growing in the Pacific Northwest is alder. Three pulp and paper research laboratories are investigating alder in that region and, besides, the U. S. Forest Products Laboratory at Madison, Wis., has now underway a study on the pulping of alder. The U. S. Forest Service's Pacific Northwest Experiment Station in Portland, Ore., plans to expand a study of alder forestry management on which little is known. But hardwoods are not plentiful enough in the Far West to be considered an important factor.

But instead of using hardwoods, the Far West mills are adding to fiber supply by using more fir than ever before and also by salvage methods.

Among important contributions to increasing fiber availability and realization for pulp and paper are 1, hydraulic barking; 2, chipping of larger pieces, reduce loss in breakdown; 3, using sawmill by-products; and 4, pre-logging and re-logging.

In addition to the fuller realization of fiber through application of hydraulic barking, along with whole-log chipping, enabling a yield of fiber from 9 acres of forest land which previously would have required yield from 10 acres with similar timber stand, pulp and paper mills are extending supply by fuller utilization of by-products and degrade wood material from lumber mills, veneer, box and plywood plants—slabs, edgings, trims, cores, and off-grade lumber not suitable for bringing up to grade. Then, too, is the small-log wood obtained by re-logging, which

also adds important volume of available wood fiber.

Extensive investigation and trials are currently carried on by many of the mills of the Pacific Coast to determine the yield and limitations from re-logging, but in this development stage it has not been found possible to arrive at a suitable yardstick to index results. The various operators know how much of this material is consumed in their plants, but the area from which the wood was harvested is not definitely measured. However, a yardstick will be obtained when the whole of the projected areas is completed, as the acreage of units are known and complete coverage is awaited to determine adequate index of the yield from re-logging.

An indication of the extent of fiber presently obtained from lumber manufacturing mill ends and trim is indicated by the mill sampling conducted in various parts of the Pacific Coast by **PULP & PAPER**. Some of the plants regularly using products from sawmills, veneer plants, etc. are as follows:

Weyerhaeuser Timber Co.'s sulfite pulp mill in Everett, Wash., is making 35 tons of pulp per day from lumber by-products;

Longview Fibre Co., Longview, Wash., is making 250 tons of pulp daily from utilization of the lumber by-products, including 155 tons of kraft pulp from sawmill chips and 95 tons of groundwood pulp from two-inch trimmings, edgings, and slabs;

Pacific Paperboard Co., Longview, uses off-grade hemlock and spruce lumber and bark-free lumber trims to produce 8 tons of pulp a day;

St. Helens Pulp & Paper Co., St. Helens, Ore., is making 85 tons of kraft paper per day from Douglas fir obtained as a lumber manufacturing by-product;

Hawley Pulp & Paper Co., Oregon City, produced 6270 tons of pulp last year from bolts, mill ends and trims, chips and salvage logging products, or about 17 tons of pulp a day.

Simpson Logging Co.'s new insulation board mill has been created to use 100% "left-overs" of the company's sawmills and plywood plants.

The positive importance of this type of raw material on the Pacific Coast is indicated by a number of mills which are under construction, or planned, which are to operate wholly or partially on this type of wood products.

Weyerhaeuser Timber Co., Pulp Division, has nearly completed its new bleached sulfate mill at Longview which is to operate on salvage wood to make 200 tons of pulp daily. The company has started work on a 150-ton sulfate mill at Springfield, Ore., for manufacture of container board in rolls, from salvage wood which will primarily be obtained from local sawmills.

Semi-chemical and kraft pulp mills are being built in Antioch, Calif., by Fibreboard Products Inc., to operate to a large extent on this kind of material, all of it

chipped in sawmills in northern California.

Work at the Forest Products Laboratory in Madison, Wis., has indicated that wood-working wastes have considerable promise for use in the production of corrugating board. The wastes used in these experiments included those from a box plant, a veneer mill, and a furniture mill. The various materials contained the following species: sweetgum, yellow-poplar, tupelo, cottonwood, walnut, sycamore, beech, and oak. The wastes were pulped by the semi-chemical process using both neutral sodium sulfite and sodium carbonate solutions. The boards made at the Laboratory were corrugated on a commercial machine and used as a component of a corrugated fiberboard. These fiberboards compared favorably with commercial fiberboard containing standard corrugating medium.

Canadian Developments

Ontario Paper Co., whose Thorold plant was the first in Canada to produce industrial alcohol from wood on a commercial scale, has been making limited use of bark in the manufacture of wrapping paper for the use of the Chicago Tribune and the New York Daily News, these newspapers being the owners of Ontario Paper Co. and Quebec North Shore Paper Co.

B. B. Gralow, assistant manager of manufacturing, Quebec North Shore Paper Co., has advised **PULP & PAPER** that the process has yet to be perfected, but that it offers exceedingly interesting possibilities. The process so far developed is essentially a modified kraft pulping method. Cardboard containers were also produced from bark.

From the standpoint of wood conservation the use of bark in this or any other commercial process has considerable economic significance. For instance, it is estimated that Ontario Paper Co. and Quebec North Shore alone could save at least 1,360 tons of sulfite and 2,040 tons of groundwood each year if bark can be used as an effective replacement.

These two mills have been making considerable use during the past year of poplar in the manufacture of newsprint, instead of the usual spruce and balsam of Eastern Canadian paper mills.

The structural board field offers the prospect for utilizing wood mill and logging "left-overs" on a large scale, but at present only a small amount in the form of shavings, sawdust and slabs is being used, largely as filler. The properties of such boards are dependent in some cases on the presence of fibers obtained from chips from round, sound logs or in other cases on the presence of binders.

T. A. McElhanney, superintendent of the Forest Products Laboratory of Canada, believes sawdust, chips from slabs and edgings can be easily converted into high quality fiber. Chipper sawdust can produce reasonably good stock when processed in machines such as the Bauer refiner or a Sprout-Waldron attrition mill, and Sutherland Refiner Co. has been engaged in interesting experimental work

in Canada in connection with the utilization of groundwood rejects.

Good quality chips obtained from waste from sawmill operations are being diverted, wherever possible, to pulp mills, but low-grade chips or chips from mixtures of wood and bark may be used to advantage in structural board manufacture.

Most of the pulp mills in British Columbia are using, in varying degree, material that formerly was classified as waste. Powell River Co. has made extensive advances in wood utilization, Pacific Mills, Ltd., is moving in this direction at its big Ocean Falls mill, and the Woodfibre plant of B. C. Pulp & Paper Co. will be able to carry out more economical use of its raw materials with its new hydraulic barker in operation this year.

The first large pulp mill to be established in British Columbia, designed to operate almost exclusively on slabs and similar by-products from sawmill operations, is that of Bloedel, Stewart & Welch, Ltd., at Port Alberni, whose 165 ton kraft mill went into production last winter. Chips are from the company's adjacent sawmill and shingle mill.

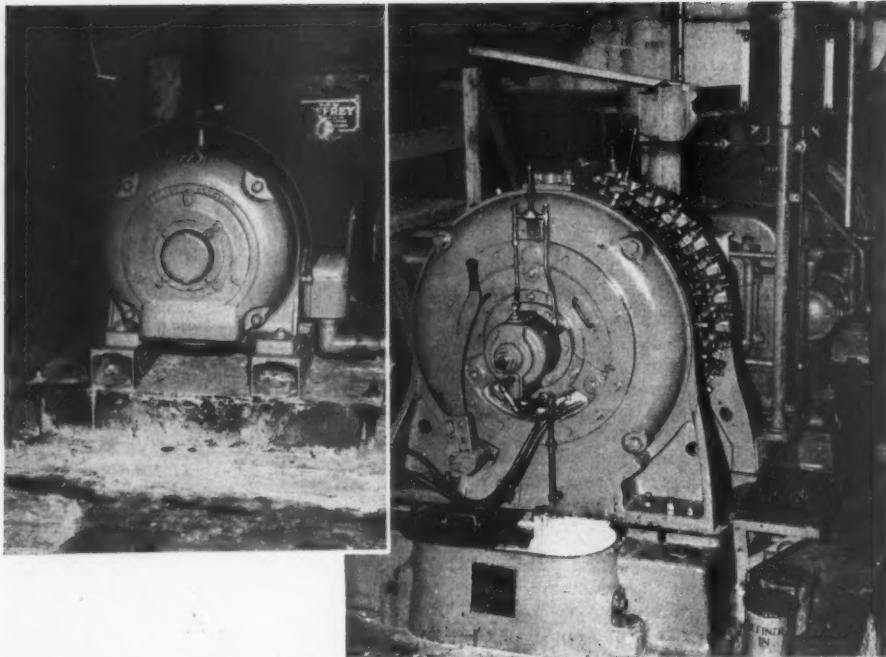
H. R. MacMillian Export Co. in Vancouver plans to build a kraft mill on Vancouver Island. This development by a company previously engaged solely in the manufacture of lumber and plywood and its shipment to world markets signifies a growing recognition of the importance of making maximum use of wood fibers.

In Eastern Canada, especially in the Great Lakes region, extensive use has been made of jack pine in recent years, and the success achieved by companies such as Marathon Paper Mills of Canada and Brompton Pulp & Paper Co. at Red Rock has set the groundwork for further expansion at the head of the Lakes. On the west coast the company that has made most effective use of pine is Sorg Pulp Co.

Poplar as a pulpwood species is being developed on a large scale on Manitoulin Island in Lake Huron by Ontario Paper Co., which has acquired several large tracts of forest there as well as cutting rights on other areas, and plans to develop them on a sustained yield basis.

Powell River Co. has recently installed machinery with which it is hoped that all waste from groundwood screenings will be eliminated. A Jeffery shredder and Noble Wood refiner have been installed in the company's old groundwood screen room.

Exhaustive tests are being conducted with these new machines to determine the maximum efficiency of each unit. The Jeffery shredder consists of several circular knives designed to deal with fairly large wood chips, such as rejects from the knotter screens and which in the past have been a total loss. The wood refiner operates like the grinder, revolving at 1800 RPM and giving a surface of approximately 12,000 feet per minute. The rotor has small grooves milled into its



EXAMPLES OF NEW EQUIPMENT which are making possible conservation of fibers and making more fibers available for pulp and paper are these installations at the Powell River Co. A shredder (left) manufactured by the Jeffrey Manufacturing Co. (drive is English Electric motor in foreground), and Noble & Wood Machine Co. Refiner (at right) compose principal units of this equipment which are installed in the Powell River groundwood screen room.

surface which act like dippers picking up an equal amount of stock each time they rotate. Grooved shoes are forced to the rotor, just as pulp blocks are forced to the grindstone through the use of hydraulic cylinders to which the shoes are attached. The machine is equipped with 21 shoes, all of which are not always in use, as treatments of various types of stock require different degrees of pressure which is accomplished by releasing or adding shoes.

At Hull, Que., the E. B. Eddy Co. is experimenting with the use of aspen in pulp manufacturing, and in recent months, according to G. A. Franklin, technical director, aspen has been used in the production of a small percentage of both groundwood and bleached sulfite pulp.

Columbia Cellulose Co., operating company for Celanese Corp. of America, has initiated tests of cottonwood to determine whether this species can be satisfactorily used in the manufacture of high grade sulfite pulp at its proposed new mill at Port Edward, near Prince Rupert. Test shipments of cottonwood have been made from the Skeena valley to New York for laboratory research.

EQUIPMENT FOR HIGH YIELD

From a process standpoint, one of the most interesting trends in recent years has been the growth of the semi-chemical processes. Higher yields result and, in many instances, a superior product is obtained from the standpoint of specific use requirements. The Asplund process, for example, is finding an increasing application in the manufacture of relatively cheap pulp for use in wall-

board, insulating felt, and other lower grades of board. Concomitant with the development of the Asplund process has been the trend toward other semichemical procedures. The objectives are the same, namely, increased yield and greater versatility as regards species utilization.

Another trend is the development of the ammonia-base sulfite process and the calcium-base sulfite process. The effects of these processes in fiber utilization, particularly in so far as recovery is concerned, offer interesting possibilities for speculation.

Also a part of the overall picture is the progress which has been made on bleaching. Higher yields and better products are resulting. Along these lines there is the possibility of cooking hardwoods by the neutral sulfite process and using chlorine largely as a pulping agent rather than as a bleaching agent, thereby producing products of higher brightness with yields in the range of 60%. The high hemicellulose content of such pulps, with its consequent ease of hydration and lower power consumption, are interesting features.

Important, also, is the use of bleached groundwood in printing papers as a substitute in part for chemical pulps as well as the greater use of hardwoods and agricultural residues. This move should contribute greatly to extension of available wood supplies. To obtain the desired brightness by using a higher percentage of mechanical fibre of high yield is a real conservation measure. When to this is added the improved printability which has been said to result from such a change, the importance of the development is emphasized.

Equipment at Bathurst

Inasmuch as a number of Southern mills were preparing to enter production on high yield pulps in 1948 it is of more than passing interest to examine the interesting high yield operation at Bathurst Power and Paper Co., Ltd., the Canadian mill which installed a kraft brown stock refining layout late in 1946. This is reported to be coming along very satisfactorily since Gordon F. Allo, Bathurst control superintendent, reported on it at Montreal in January of 1947.

In order to obtain a greater yield of pulp from the wood used, a much rawer or harder pulp needed to be cooked. This meant knots, and many undisintegrated chips and fiber bundles exceedingly difficult to wash free of black liquor. The problem was to refine in order that chips, knots and bundles could be broken down so that it was possible to obtain a sheet on the washers more easily washed free of residual liquor with reasonably low chemical losses. It was decided to refine the pulp while suspended in the hot alkaline cooking liquor before washing and before the removal of knots.

It is now reported that, after a full year of continuous operation, there have been increased yields and, in addition, chemical consumption has been lowered, and pulp capacity has been increased. Briefly the general layout is as follows: Four digesters of 3,116 cubic feet capacity each, discharge into a central blow tank which holds four large cooks. In the blow tank pulp is diluted in the area around the agitator, with black liquor from the washers. A Foxboro consistency regulator controls the consistency to an average of 3.25 per cent; temperature of stock leaving blow tank is approximately 175 degrees Fahrenheit. From the bottom cone of the blow tank the regulated stock passes through a magnetic separator, a centrifugal pump and one Miami No. 6 jordan to the Sutherland refiners. The three Sutherland refiners operate in parallel, receiving their stock supply from the main header pipe which has a controlled by-pass returning to the blow tank. Refined stock from the Sutherlands drops by gravity to a small refined stock chest equipped with an agitator. From the refined stock chest the pulp is pumped to two Nyman-Swenson washers operating in parallel. The washed stock from the vacuum washers is broken up and diluted to 3.50 per cent consistency in a re-pulper, then drops by gravity to the storage chest.

Pulp from the storage chest is pumped to the knotter head box where it is diluted and fed by gravity to six Sherbrooke knotter screens. Accepted stock feeds by gravity to a vacuum thickener and drops from there to a storage chest. From here it is regulated to 3.25% consistency and pumped to a Miami No. 6 jordan, then to three Sutherland refiners in parallel.

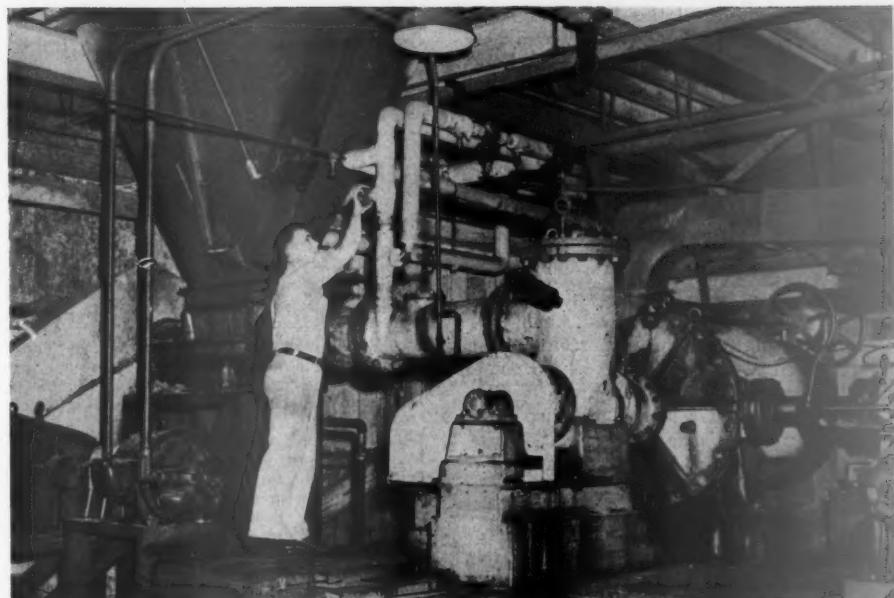
R. G. Goodwin, Paper and Industrial Appliances, in his study *Further Progress in Continuous Pulp*, has compared straw pulps as made by three distinct

methods—rotary digester, low pressure; Chemipulper-Defibrator, high pressure; and the Morley Continuous Pulper using atmospheric pressure.

Test data and straw pulps made in a rotary digester by standard procedures as used in a 9-point straw board mill were supplied for comparative tests. The Thames Board Mills, Purfleet, England, supplied the straw pulps made by the Morley Continuous Pulper. The Chemipulper-Defibrator straw pulps were prepared by Mr. Goodwin. Two English mills are presently using the patented atmospheric pressure straw cooking system. This system consists of (1) The straw cutting operation, (2) air blower or conveyor for cut straw to hopper feeding No. 1 tube, (3) four 24-inch diameter tubes which are approximately 30 feet long and equipped with screw conveyors. Each tube is equipped with an orifice discharge end by tapering the final 2½ feet at a 10-degree angle. Two straw cutters are required to cut the air-dry wheat straw into approximately 2 to 3-inch lengths. The present operation requires approximately 4,500 lbs. of cut air-dry straw per hour. The caustic soda make-up tanks supply 3% liquor as NaOH to the continuous pulping system. The Morley Continuous Pulper and auxiliary equipment requires approximately 7,000 cubic feet of building space, according to Mr. Goodwin.

The air-dry cut straw drops into a pipe and is moved forward by a screw conveyor. The cooking tubes are operated at full capacity throughout and in this manner mechanically aid the pulping operation by rubbing out the hot and chemically impregnated nodules of the straw. The straw is treated with a three per cent caustic soda solution at about 175 degrees F., recovered cooking liquor and steam. The air-dry straw consumes approximately 9-10% NaOH and a cooking temperature of 200-205 degrees F. is maintained. The cooking tubes operate at approximately 25% consistency. The Morley Continuous Pulper requires approximately 2,000 lbs. of steam per ton of pulp. The final tube is used as a washer and requires approximately 5,000-6,000 gallons of water per ton of straw pulp. The straw pulp is discharged from the washer tube at 69-70% yield based on straw as received which contains on the average approximately 12% moisture. The 9-point corrugating pulp is passed through a high-speed Emerson Jordan immediately following the Morley Continuous Pulper. The pulp is screened at this point and the rejects amount to approximately one per cent using a 25-cut plate.

The Morley Continuous Pulper was made to continuously and at lower cost produce an improved quality 9-point straw pulp. Mr. Goodwin stresses that in the patent structure, proven by mill operating experience, the difference is mainly that the nodules are chemically impregnated and mechanically rubbed out at atmospheric pressure on a continuous cycle as compared to batch cooking at higher temperatures and longer cooking cycle which tends to degrade the finer fibers in its effort to impregnate and



DIFFERENT QUALITY OF FIBERS are produced with these high yield pulping machines at the new and very modern insulation board mill of Simpson Logging Co., Shelton, Wash. Top—Asplund Size C Defibrator. Below—A row of continuously fed Bauer Bros. No. 185 type Pulpers. How they are used is told on this page.

treat the nodules. This continuous atmospheric pressure straw cooking system requires approximately eighteen to twenty minutes to make a pulp suitable for 9-point corrugating. The cooking time cycle may be regulated to adjust for varying local straw conditions.

Several tests, says Mr. Goodwin in his study, have been made using the Chemipulper-Defibrator equipment to make 9-point corrugating straw pulp continuously. Test data is incomplete at this time on what may be possible using high pressures and a very short cooking cycle to make a straw pulp suitable for 9-point corrugating.

Mr. Goodwin summarizes that "test data indicate that the continuous cooking of straw in the Chemipulper-Defibrator will make pulp equal to that now produced in the rotary digester for 9-point corrugat-

ing. The Morley Continuous Pulper using steam, chemical and atmospheric pressure is able to make a 9-point corrugating pulp which has better strength characteristic than either the rotary digester batch type operation, or the continuous system using the Chemipulper-Defibrator at high pressures and temperatures. The good stiffness characteristics of the straw pulp made in the Morley Continuous Pulper makes it possible to use a high percentage of waste papers in the 9-point corrugating, and this same pulp may be used in tube stock and in other furnishes where rigid characteristics are required."

Simpson Mill Is Example

A remarkable demonstration of improved wood utilization and also of equipment designed to produce high pulp

yield is the new insulation board products plant of Simpson Logging Co., which has been operating for a year at Shelton, Wash.

This long-time leader in Far Western timber industries is logging clean in the woods and wood "left-overs" from sawmill and plywood operations are being fed to the new board mill. Only two trees are felled today where three were formerly cut, and yet Simpson is making 35% more building materials.

A portion of chips go to an Asplund Size C Defibrator, supplied by American Defibrator Co., providing a percentage of long-fibered stock. In the Asplund machine, there is a screw feed and it defibrates chips under steam pressure between a rotating disc and a stationary disc. Three Babcock & Wilcox rotary digesters cook another larger portion of chips and these are conveyed to a battery of No. 185 type Bauer Bros. Pulpers. In the Bauers, it is a different process than in the Asplund Defibrator, in that hot water is used instead of steam; there is no pressure used and both of the Bauer discs are revolving.

In the Bauers, the temperature of water and quantity of chips governs freeness and their operation permits products of different freeness. In the blending box ahead of the decker and machine chests and the Fourdrinier machine, one feed pipe leads from the Asplund, two from the Bauers and one from the broke box. Thus, this mill is an example of varied stock preparation with these machines.

One of the most interesting expansions along high-yield lines in the South is taking place at Brunswick Pulp & Paper Co., Brunswick, Ga., a mill allied with Mead and Scott. A several million dollar program here is designed not for increased capacity, necessarily, but for getting more yield per unit of wood.

Here is what Brunswick is doing: rearranging woodyard and adding conveyor equipment; rearranging method of unloading from cars; adding to chipper capacity; adding to drum barker capacity; adding to chip bin and digester capacity; erecting new recovery system; installing new lime kiln; completing additional water system and bleach plant. These and other improvements (May, 1948, issue of **PULP & PAPER**) all tend in one way or another to offset the increasing cost of pulpwood through higher yield—for high yield progress is not categorically confined to cooking processes alone.

Another Southern program along the same lines is seen in activities of National Container Corp. at Jacksonville and Big Island. The latter improvements include a Chemipulper-Defibrator system.

RECLAIMING PAPER AND RAGS

Although the rag industry is not large in terms of overall tonnage figures, it would seem attention to the shortages of raw materials caused by shortages of rags and especially by the admixture of synthetic fibers into various textiles is important, an Middle West research official told **PULP & PAPER**. The latter, of



DR. HARRY LEWIS (left) of Institute of Paper Chemistry, Appleton, Wis., who suggests that textile mills segregate rags according to furnish to help paper mills to reclaim rags containing resins.

DR. EDWARD G. LOCKE (right), of U. S. Pacific Northwest Forest Range and Experiment Station, Portland, Ore., says: "Additional expansion of pulp and paper in the Pacific Northwest must be predicated on thinnings from second growth stands, sawmill left-overs and salvage from logging operations destined primarily for plywood and sawlogs. This limits development largely to kraft and high-yield semi-chemical pulping. Undoubtedly, the container board industry is due for expansion."

Dr. Locke told **PULP & PAPER** the Portland station will expand its study of Northwest alder management, and said several labs are studying its possible uses for pulp.

course, raises very difficult problems from the standpoint of processing.

In an effort to meet this situation from a long-range standpoint, there is an interesting experiment going forward in Texas where cotton is being grown experimentally for the purpose of determining the economic and technical aspects of the production of cotton for the rag paper industry.

The reprocessing of waste paper has always been an important means of recovering or salvaging fiber. Most important from a tonnage standpoint is the paperboard industry, although one should not overlook the deinking of waste for use in publication papers. These various recovery processes are being complicated by the use of wet strength resins and by the development of certain new types of inks. From a percentage standpoint, the quantity of paper which is being treated for wet strength is not particularly large. Its occurrence, however, in small fractions of the waste raises certain problems of identification and processing that are out of proportion to the percentage of that occurrence. One of the means which has been developed for reworking such waste is the Steam Jet Process, introduced by American Cyanamid and Chemical Co.

Centering attention on the economic trends which "enhance the importance of using all the waste that can be collected" Dr. Ruth Shallcross of the Institute of Paper Chemistry, points out that rags make up a small though important proportion of the whole, their consumption declining slowly and steadily for several years. The consumption of straw and other fibrous materials is, as yet, very small in comparison with the whole. In 1947 wood pulp comprised 59% of the total consumption of all fibrous materials and waste paper 35%, the others

making up the 6%. Before World War II the status of waste paper was only 28 or 29% of the total fibrous materials. All signs point to a continuing gain, and the gain during and since the war has been rather spectacular.

"Cost of pulpwood is destined to increase rather than the reverse," says Dr. Shallcross, "because of its growing scarcity, and of higher labor costs, and also because of the economic unavailability of much of the supply." She points out that future pulpwood supply must be largely second growth, which costs more than virgin wood. Conclusion: "the mills will be forced to turn more and more to waste paper where at all possible." It is estimated that the number of mills using waste paper since the beginning of the war has about doubled.

Dr. Shallcross states categorically that it would seem, from a study of the pulpwood situation, that it is "economically imperative that we turn our attention to the utilization of more waste paper"—but she warns that if the paper and paperboard mills must look forward to ever-increasing costs as the result of the increased use of wet-strength agents, then mills may have to turn elsewhere for fibrous materials, perhaps to agricultural residues and the like, or to new growth of specific materials. What we must do, Dr. Shallcross says, is find out whether waste paper as a raw material is, like pulpwood, subject to the laws of increasing costs or whether, by our ingenuity, we can learn how to utilize the good fibers in waste paper without great expense, even though perhaps enmeshed in wet-strength resins.

There is everywhere ample evidence that both the public and the industry is aware of the possibility and the need. This Spring the City of New York got together and sold over 1,000 tons of old printed matter to a New Jersey mill. The mill got raw supply, but New York also profited—not merely on the sale of the paper. It saved \$1,500,000 yearly in warehouse rentals! This raises the interesting question as to how much waste paper is already available in warehouses and attics—paper made before the advent of wet-strength. One year supply for the industry? Five years? It could be ten years, if people and municipalities were willing to clean house and an efficient collection system could be set up.

The users of waste paper are not the only mills which have developed a serious headache due to a change in the ingredients of raw supply. The rag mills have their troubles, too. Dr. Harry Lewis, of the Institute of Paper Chemistry, has made a study of that situation. He points out, as background, that in 1940 the writing paper mills were using 50,000 tons of rags, while in 1944 the tonnage had jumped to 100,000 tons. The tonnage represents only about 10 to 15% of the overall rags consumed by the industry, but it may be identified as the quality cream. Use of rags was once a simple matter. But now there has been introduced in men's collars, for example, cellulose acetate. Now there are a dozen or more

resins possible in rags—the acrylates, the alkyls, the cellulose ethers and other esters, synthetic rubbers, vinyl resins, or coumarine-indene resins, to mention only a few. Certain dyed rags present new problems, as in the case of vat-dyed kahkis prevalent in war time.

The solution, says Dr. Lewis, is not easy. First thought is always to identify the rags and reject the unsuitable ones. It is not easy, as any paper mill man knows. Another solution is to remove resins before rags are cooked, by some powerful organic solvent. But the multiplicity of the possible resins in the contents makes this a dangerous approach. A third approach—and Dr. Lewis admits it is a tough one—would be to develop a cooking procedure which would dissolve the resins without affecting the cellulose.

The solution recommended by Dr. Lewis is for the textile mills (he is speaking of cuttings) to segregate the rags at their mills by furnish. Research would be necessary to set up standards, and such research might well be cooperative between the textile industry and the paper industry.

"Waste dealers, textile manufacturers, and fine paper mills are all bound together in the situation," Dr. Lewis said. The paper mills are painfully cognizant of the problem, but the textile mills seem blissfully unaware, principally because they are twice removed from the manufacture of fine papers. And resin manufacturers are just beginning to become interested in the problem. Certainly a great many industries are affected, technically and economically.

Dr. Lewis feels the situation can be solved, but he admits it is not nearing perfect solution at this time. And he is insistent on the point that the procurement of 50,000 tons annually of cotton fibers at low cost is certainly essential to the current operation of fine paper mills. His big point in the rag situation is this: Cooperation (of industries affected) beyond the bounds of past experience will be necessary to insure the supply of rags of necessary quality and volume.

MORE FIBERS FROM DE-INKING

De-inking as a means of reclaiming fibers for papermaking, especially for cultural printing papers, has been an economically successful process in the Middle West for many years. But according to some of the leaders in this field, interviewed by **PULP & PAPER** during calls on the mills in that area, much more can be achieved in this direction.

Presently, the Middle West mills alone reclaim about 30,000 tons of paper, achieving only about 65% retention in the reclaiming process. Among the mills which are prominent in de-inking are Bergstrom Paper Co. and Combined Locks Paper Co. in Wisconsin; Michigan Paper Co. of Plainwell, Allied Paper Mills, St. Regis at Kalamazoo, Rex Paper Co., and the Champion, Mead and Oxford mills in Ohio.

Here is a symposium of the ideas which several leaders of the Middle West de-



DWIGHT L. STOCKER (left), President and Gen. Mgr., Michigan Paper Co. of Plainwell, which has recently successfully introduced 80% de-inked stock for newsprint paper production.



F. B. OLDHAM (right), President of American Industrial Co., 68 Main St., Buffalo 2, New York, whose company has developed one of the new processes for the de-inking of newsprint for newsprint manufacture. "We are building a mill at Gary, Ind., where newsprint will be made by our process and we are making plans for a large newsprint mill in New York City," he wrote **PULP & PAPER** recently.

inking mills expressed to **PULP & PAPER** in personal interviews:

1. A greater retention of fibers can be achieved, with probably only a 10% loss instead of the present average loss of 35%.

2. About 15 million tons of waste paper and board could be collected. Only about half of that amount is now being collected.

3. A greater portion of the waste paper collected might be directed to fine paper mills, instead of virtually all of it going to board mills, as is presently the case.

4. Ink manufacturers could produce inks mixed with chemicals which would facilitate de-inking. Combined Locks Paper Co., at Combined Locks, Wis., has for years been supplied with phone directories printed with a special bleachable ink and the mill has its own SO_2 bleaching process.

5. Publishers of Time, Life, Colliers and other big circulation magazines can benefit themselves and assure a paper supply for their publications if they take an aggressive part in this enterprise. They could make research pay dividends for themselves by studying ways and means of increasing de-inking retention, and they are in a position to do a great deal through their far-flung control over printing and paper use and distribution.

6. The hope of these de-inking mills, of course, is that they could get enough de-inking recovery to bring some reduction in prices of market wood pulp.

There are several de-inking processes. Manufacturers of equipment have opportunities to further modernize these processes. Some of the equipment has had to be made in the mills' own machine shops. Generally, these steps are followed in de-inking:

1. Defibering. Defibrators, beater-rod mills and shredding with a hog.

2. Alkalizing. Alkali cooking to dissolve binders of ink.

3. Washing. Usually a standard decker system.

4. Screening.

5. Sand settling.

6. Bleaching. Calcium hypochlorite or sodium hypochlorite bleaching of one to three hours is generally practiced. The new trend is to two stage or multiple stage bleaching instead of just single stage.

De-Inking of Paper

The pulp situation centered tremendous interest in 1947 and this year on de-inking.

One of the developments is making of newsprint from 80% de-inked stock at Michigan Paper Co. of Plainwell.

Sheffield Paper Mills, Saugerties, N.Y., was purchased in Dec., 1946, by Buffum & Co., Chicago, for the express purpose of manufacturing de-inked newsprint from waste stock in a cold process developed by F. B. Oldham of Buffalo. At that time there was projected a sizable corporation to operate de-inking mills, but in a organization of Sheffield this project did not appear, and Mr. Oldham—not a member of the new group—has worked out arrangements for the use of his process in two other mills. Active direction of the Sheffield mill is now under publishing interests represented by the St. Lewis Dispatch, Indianapolis News, Dayton Daily News, and Fairchild Publications of New York City. Edgar W. B. Fairchild, president of Fairchild Publications, was selected as president of the operation at Saugerties. But Mr. Fairchild told **PULP & PAPER** in April that the operation has not been practical, that they are not de-inking now and that the mill is for sale.

It should be noted definitely that the growth of de-inking is not entirely based on the tight supply of newsprint. Many of the improvements in de-inking processes are tied directly to the need for what have become the very direct competitors of newspapers—the big magazines. And some are to bolster the supply of business and industrial magazines.

One very large company with mills in the Midwest and South has informed **PULP & PAPER** that it is using the hot process, using a chlorine bleach. This company gets out approximately 80 tons per day of de-inked pulp. The vice-president in charge of research and engineering states that they "make no special provision for segregation of wet strength paper. We sort only for groundwood and dirt-producing papers."

Sorg Paper Co., Middleton, Ohio, has reworked certain kinds of paper for several years. Because of the nature of the waste (mostly coated stock) it has always been handled by cooking for several hours under pressure in rotaries with a mild alkali. The material is then washed and bleached with conventional washer equipment. The bleaching agent is calcium hypochlorite, and about 12 tons per day are produced. The bleached product is used either as slush or wet machine laps.

According to R. B. Roe, Technical Di-

DIMENSIONS OF FIBERS FROM VARIOUS PLANTS AND WOODS

Fiber	Max.	Length			Diameter			Ratio- Av. length diameter
		Min.	Ave.	Max.	Min.	Ave.		
Wheat, barley, oats, rye straws	3,120	680	1,480	24	7	13.3	111:1	
Rice straw	3,480	650	1,450	14	5	8.5	170:1	
Esparto grass	1,600	510	1,100	14	7	9.2	120:1	
Bamboo	4,350	1,450	2,700	27	7	14.0	192:1	
Sugarcane bagasse	2,800	800	1,700	34	10	20.0	85:1	
Cornstalks	2,900	500	1,500	24	14	18.1	84:1	
Jack pine wood			3,000	...	...	40	75:1
Red spruce wood			2,700	...	...	32	85:1
Aspen wood			1,000	...	...	26	38:1
Red gum wood			1,600	...	...	32	50:1

rector, they have followed no particular procedure in handling wet strength and other special types of waste, other than to try to avoid them. Those kinds of waste, such as blue-print, which respond satisfactorily to an alkaline cook, are frequently handled. Wet strength papers containing resins are avoided as far as possible.

Said Mr. Roe: "Although the present world shortage of wood pulp makes the utilization of waste paper particularly desirable, this company does not plan to enlarge or increase the capacity of the present equipment."

The Wheeler Paper Corp., Albany, N. Y., has been making a specialty of de-inked pulp by a cold water process and has been advertising this fact to non-integrated mills, stating that it can produce pulp to specifications which can be used for purpose "from facial tissue to board."

It is known that the St. Regis Paper Co. has been having pioneer success with its waste paper pulping process at its Kalamazoo, Michigan, mill, as a result of redesign of its equipment to increase production.

A similar system is having marked success at Newton Falls Paper Mill, Inc., Newton Falls, New York. Here waste—chiefly ledger stock and magazine stock—is treated in a 14-foot Hydrapulper which has been charged with water at 160 degrees Fahrenheit into which has been introduced Solozone bleaching agent with caustic soda, about one and a half percent of each. The stock then proceeds to two cook tanks of 12,000 pounds capacity each.

Apparently the Shartle-Dilts Hydrapulper action is particularly good for preparatory on de-inked pulps. When equipped with a junk remover and ragger, followed by a grit remover system, the dirtiest stock appears to be quickly slushed, cleaned and made ready to refine. Operated alone, it handles virgin pulp and clean mixed papers, reducing them quickly, ready for refining to run liner and other fine grades.

Fitchburg Paper Co., Fitchburg, Mass., is also having excellent results in reclaiming waste and improvements and additions are under-way at this mill which should be in operation by mid-summer. This, too, is the hot process with Hydrapulper preparatory.

The process involving Solozone has been restricted due to the tremendous demand for this product for ordinary bleaching, but it is expected that supply will improve.

Admittedly, the development of wet



DR. E. C. LATHROP (left), Head of the Agricultural Residues Div., U. S. Dept. of Agriculture, Peoria, Ill., and (right) S. I. ARONOVSKY, also of the Peoria Laboratory and Chairman of TAPPI's Agricultural Residues Committee.

A report on the work of these men with wheat straw is published on these pages.

strength papers has been a mixed blessing when de-inking is considered. But, as one paper mill man pointed out, it is unfair to make a villain of wet strength papers—for they are a real contribution to the industry and were not designed as broke. Nevertheless, developers of wet strength resins have carried on considerable research in the repulping of wet strength papers. Notable is Technical Bulletin No. 18 "The Steam Jet Process for Repulping Wet Strength Paper" issued by the Paper Chemicals Department of American Cyanamid. The essence of steam jet process consists in treatment of the wet strength paper at fairly high consistency in a beater with the roll raised off the bed plate; introduction of high-pressure steam through nozzles located at specific points adjacent to the backfall of the beater; and maintenance of suitable temperature and pH conditions. This procedure has been in use commercially for more than a year in at least one mill and is said to offer the possibility of eliminating to a large extent the drawbacks to economical and convenient re-use of melamine resin treated paper.

The basic problem in reclamation of paper is to a large extent the deterioration that has taken place in the gathering and assembly of waste. In a less hectic economy waste paper was available in greater quantities, at lower cost, and represented a product which was almost standardized. This is no longer the case except in the happy view of those mills which have discovered a dependable high standard source.

Monsanto Chemical Co. has also entered

the de-inking field with a product and claims notable success in tests in a Midwest mill manufacturing magazine paper.

WHEAT STRAW FOR FINE PAPERS

In the development of agricultural residues for fiber, the spotlight this year is shining brightly on the Department of Agriculture's Northern Regional Research Laboratory at Peoria, Ill., where years of work on a process for using wheat straw to make magazine, book, litho, offset and other fine papers has reached a point where it is ready for mill scale trial. In fact, it is understood the process already is being used successfully in Holland.

This is going far beyond the present use of only about 600,000 tons annually of straw for making strawboard in about 25 mills of this type in the Middle West.

A number of years ago there was quite a little interest aroused over the possibility of paper being made from corn stalks. The Maizewood Insulation Co., of Dubuque, Iowa, operating the only pulp mill in that part of the country, is still making about 55 tons daily of pulp from mixture of corn stalks, wood, flax, hemp and straw, and uses Biggs and Manitowoc digesters, a Marcy rod mill, Vortex beaters, Claflin refiner, and a Fourdrinier ahead of Coe dryer.

Dr. E. C. Lathrop, head of the Agricultural Research Administration at Peoria, told **PULP & PAPER** that "a number of important paper organizations have been discussing the possibility of pilot plant runs on this sodium sulfite process for fine papers."

S. I. Aronovsky, chairman of TAPPI's agricultural residues committee, and Dr. Lathrop undertook the work at the laboratory "in the belief that the time must come when our viewpoint towards cellulose sources in this country would have to undergo a pronounced change," said Dr. Lathrop. "We recognized that the economics of straw procurement was probably the bottleneck and this was the first problem that I undertook in our work. You may be interested to know that it took just seven years to bring about the meetings at the Northern Regional Research Laboratory (beginning in 1945).

"I believe that the economic crossroads between wheat straw, which was produced in this country last year in the sum of 95 million tons and of which we believe at least 40 million tons were burned or utterly wasted, and pulpwood has just about been reached," he said. "You will note that we believe that fine straw pulps will find their place as blends with certain wood pulps in the manufacture of a wide variety of specialty papers. This usage can greatly increase our raw material cellulose resources and I believe produce more valuable papers than we are producing at the present time."

He also pointed out the increasing use of flax seed straw bast fiber in the production of cigaret and other fine papers.

Messrs. Aronovsky, Ernst, Sutcliffe, Nelson in a paper entitled Agricultural Residue Pulps—Comparison of Pulping Processes (presented at New York Paper Week) revealed:

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This development has been enhanced by progress made in the increased mechanization and efficiency in collecting and baling agricultural residues, particularly cereal grain straws—and by an increasing awareness of the great economic loss entailed by the insufficient utilization of agricultural residues.

One of the experiments was with combine straw from soft winter wheat, Wisconsin Pedigree, grown in central Illinois in 1943.

Pulps were screened through an 8-cut slotted screen plate, it being determined that larger slots (4-cut plate) yielded only slightly larger amounts of screened pulp. The bleach consumption of the pulps was determined by the single-stage hypochlorite method on a 10-gram sample. Large-scale bleaching was on two-pound samples of screened pulp in three stages: chlorination with chlorine water; treating washed chlorinated pulp with one per cent NaOH; and bleaching washed pulp with the remainder of the chlorine as hypochlorite at 12 per cent consistency and 35 to 40 degrees Centigrade for one hour or exhaustion of the chlorine, washing until free from hypochlorite, acidifying until free from H₂SO₄, and washing the residual until washings were neutral.

A series of cooks were undertaken to determine the effect of varying ratios of total liquid to straw, and these ratios varied from 5:1 to 8:1. It was shown that although there was no significant difference in the pulp yields and in the chemical and physical properties of the pulps, there was a trend toward better and stronger pulps with increasing ratio of total liquid to straw. The ratio of 7:1 was selected for the remainder of the pulping experiments discussed here. Other constant cooking conditions: cook temperature of 100 psi steam pressure, cooking time of two hours at maximum temperature. Yields of crude pulp and screenings decreased regularly with increasing amounts of caustic soda used for pulping, whereas the yields of screened pulp showed little change. The quality of screened pulp, however, as indicated by decreased ash and lignin content, decreased permanganate number and chlorine consumption (to produce brightness of 70) and better strength characteristics, increased with amounts of caustic soda used. It appeared that 12% sodium hydroxide, basis straw weight, was the minimum chemical requirement to produce a satisfactory pulp under the conditions of these experiments.

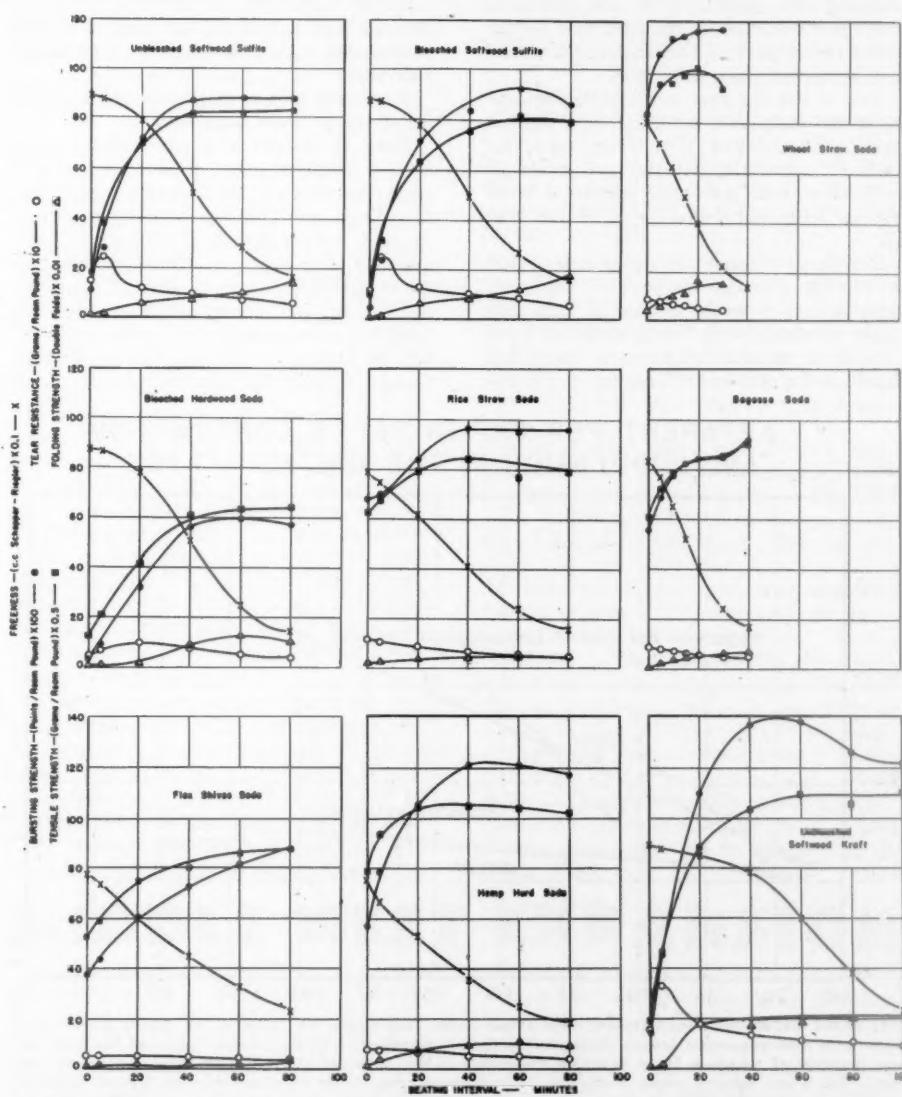
Kraft pulps were made under the same conditions. Cooking chemical consisted of two parts sodium hydroxide to one part sodium sulfide, and the total amounts varied from six to 16% of the weight of dry straw. Yields of screened pulp were somewhat larger, and yield of screenings somewhat smaller, than in the soda process. Strength properties were only slightly lower. Cooking with 12% kraft chemicals was indicated by the data of the experiment.

Experiments were also carried forward on pulping wheat straw with varying

(Continued on page 163)



PULP DIGESTION EQUIPMENT in the Northern Regional Research Laboratory: (1) and (2) stainless steel, 12-gallon capacity autoclaves; (3) blow line; (4) blow pit with perforated stainless steel false bottom; (5) spray tower for removal of noxious fumes and gases.



BEATING AND STRENGTH CHARACTERISTICS OF WOOD AND AGRICULTURAL RESIDUE PULPS. STANDARD SHARP BEATER.



1948 Is Biggest Year FOR COMPLETING PROJECTS

EXPANSION and modernization of the North American pulp and paper industry has been its No. 1 subject of interest and discussion for three years running now. But back in 1945 and 1946 very few would have thought that by far the greatest part of this expansion would not be taking place until 1948.

This is the big year, principally because so many expansion projects were pushed along and delayed time after time, by lack of materials, delayed deliveries of equipment and generally unsettled conditions following the close of World War II.

For three consecutive years now, **PULP & PAPER**, through its staff of traveling field editors in every region of pulp and paper production in North America from Canada to Mexico and coast to coast, has conducted a mill-to-mill survey of expan-

sion and modernization programs. Again re-checking the data collected in these recurrent surveys, it is revealed that the greatest part of this program is still unfinished. Actually, it is very probable that at least a half-million tons of added production may not even be completed this year.

Over one billion dollars is being spent on these projects annually.

PULP & PAPER'S survey shows that nearly 3,000,000 tons annually of added pulp production in the U.S., Canada, Newfoundland and Mexico is being achieved in this 3-year program, bringing total capacity for pulp on the continent to about 19,500,000 tons in 1949. Expansion in the United States is calculated at 1,956,000 tons annually of pulp with 1,150,000 tons in the South. On the Pacific Coast of both Canada and U. S. it is

NEW PAPER MACHINES FOR U. S. MILLS

(According to survey by American Paper & Pulp Assn., and its divisions)

	Number of Machines —	1946	1947	1948	Total
Fine Paper	5	—	—	—	5
Book Paper	2	—	4	—	6
Tissue Paper	5	11	8	—	24
Kraft Paper	—	3	3	—	6
Sulfite Wrap	—	—	7	—	7
Groundwood Paper	1	—	—	—	1
Newsprint	—	—	1	—	1
Total	6	21	23	—	50

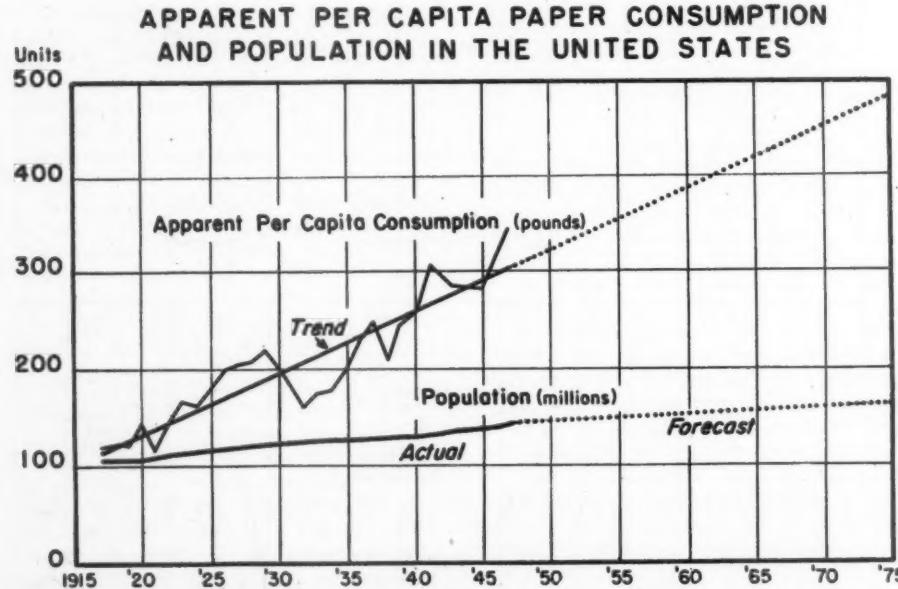
510,000 tons, not counting two or three projects in formative stage.

In pulp and board, the continental total of added annual tonnage in the entire postwar expansion period is about 3,700,000 tons, with 3,125,000 tons being added in the United States alone, and approximately half of that amount in the South. Slightly over a million tons are being added in Midwest and Northeast states. On the Pacific Coast of U. S. and Canada about 600,000 tons are being added. Aggregate capacity for paper on the entire continent, on completion of this program, would be brought to 27,600,000 tons.

It is interesting that the calculations arrived at through the independent survey of **PULP & PAPER** editors are strikingly in close accord with the surveys on United States capacities alone, made by the U. S. Pulp Producers Association and the American Pulp & Paper Association, with the assistance of its divisions and the National Paperboard Association. These survey figures are also published in this section. The slight disparity in figures for paper mill expansion, for instance, could be mostly attributed to the fact that in our survey we adopted 300 working days for a year while American Pulp & Paper Association used 310 days in projecting calculated daily tonnages.

The paper industry associations in 1946 estimated 3,000,000 tons of added annual paper and board capacity in the United States would be installed by 1948, with all but 500,000 tons to be installed by Jan. 1, 1948. Unforeseen delays resulted in the collapse of this program. A survey completed and announced by the APPA on Dec. 11, 1947, showed the three-year expansion figure has increased to 3,258,860 tons, annual capacity, virtually confirming the figures announced in our North American Review Number last April, based on **PULP & PAPER'S** survey.

The APPA reports that of this expansion, 1,765,320 tons remained to be put into operation in 1948. By grades, its figures for expansion over the three-year period are broken down as follows:



THIS CHART SHOWS the steady upward trend of per capita consumption of paper in the United States—at a faster pace than population growth. Perhaps Cole Parker, president of Kimberly-Clark Corp. and this year the new president of American Paper and Pulp Association (which prepared this chart) has the explanation. He says: "This is one industry whose production, as it increases, also forces increased demand. Use of paper is an index to civilization itself; as civilization spread, demand for paper again increases." In another chart in this section, the rise of production and consumption of paper since 1860 is shown. Apparent consumption is production plus imports less exports.

	Tons-Annual
Paper	1,372,060
Paperboard	1,410,950
Building Board	475,850
Total	3,258,860

The APPA has calculated that total paper machine capacity for the United States alone will be brought to more than 23,500,000 tons annually on a 6-day 24-hr.

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RESULTS OF SURVEY OF THREE YEARS OF EXPANSION MADE BY EDITORS OF PULP & PAPER IN ALL REGIONS OF NORTH AMERICA

Daily Capacity in Tons

	—Pulp—		—Paper—	
	In 1946	To Be Added by 1948	In 1946	To Be Added by 1948
U. S. - Canada	55,000	9,234	80,000	11,620
U. S. Only	36,700	6,484	64,533	10,415
Canada	18,300	2,750	16,450	1,205
South (U. S.)	14,225	3,840	19,000	5,180
Pacific Coast (U. S. - Canada)	8,710	1,694	6,472	1,945
Midwest - East (U. S.)	13,300	1,715	40,000	3,615
Eastern Canada - Newfoundland	12,000	1,985	13,000	880
Mexico	105	416	330	486

week basis by the time this program is completed.

President Cola G. Parker of APPA said that, after allowing for inventory building to normal, he figured a 95% year-end production ratio in 1948 with production of 22,100,000 tons would satisfy demand.

EXPANSION IN NORTHEAST

A NUMBER of the expansion programs previewed in the 1947 North American Review Number for the eastern seaboard states are now completed.

It is still true that the general trend of expansion in this area is based on hardwoods and new sulfite cooking processes, and on groundwood processes taking advantage of improved bleaching techniques. But it is also worthy of note that some of the expansion is in the "making more fibers" category—the processing of waste paper. The improvements at Fitchburg Paper Company, Fitchburg, Mass., which was to be completed this spring, and the expansion of facilities in Newton Falls Paper Mill, Inc., Newton Falls, N. Y., are in that classification.

Another facet of expansion coming up in this area is in the board field. The east is taking its place with other areas in increased attention to this market. It is said that National Gypsum Co., Buffalo, is now examining equipment data for a new board mill. It already has its new combination felt and paper machine in the Jersey area. The three trends visible in a projection toward 1950 are still these: Efforts to capitalize on popularity of tissue uses, attention to paperboard and specialty papers for use in the ever-widening package field, and the new and converted book paper machines with coating on the machine.

Hammermill Paper Company, Erie, Pa., is moving toward getting into production on its new Rice, Barton machine along with other improvements. W. C. Hamilton & Sons, Miquon, Pa., is under way with its new machine. Gibraltar Corrugated Paper Co., North Bergen, N. J., went into production and then set down for improvements based on commercial runs. These improvements, dealing chiefly with pulp treatment, were expected to be completed this spring.

Brown Company, Berlin, N. H., com-

Barring disruption of war or defense controls, Mr. Parker said recent APPA calculations indicated paper consumption of 30,000,000 tons in the U. S. in 1950, or 400 lbs. per capita for a population of 150,000,000, with 5,000,000 tons imported and 25,000,000 tons made on U. S. machines.

pleted its 200-ton sulfate mill. The old international mill now owned by Scott Paper Co. at Fort Edwards, N. Y., is operating the machines installed there in 1945 and late in 1946. International at Palmer, N. Y., has substantially increased production on bleached groundwood.

The renovated pulping operations of B-F-D Company at Ogdensburg have come to completion and are now producing 200 tons daily for the Ogdensburg machines and for the Plattsburg mill. At the latter location a new machine will soon be in operation, and a new plant addition is being erected for expansion in their production of molded pulp products.

Equipment which will double the output at New York and Pennsylvania Co., owned partly by Curtis Publishing Co., at Lock Haven, Pa., is now under way after considerable delay beyond control of the management. The new machine adds 125 tons daily. The improvements at Seaman Paper Co., Otter River, Mass., including beaters, pulper, and ventilating equipment, are in; and Hopper Paper Co., Reading, Pa., has completed improvements.

Westfield River Paper Co., with two mills in Massachusetts and two mills in Pennsylvania, has an expansion program which will soon get under way. It will be a long-term project and details are not available. Riegel Paper Co., Milford, N. J., put its new glassine machine into operation, and work is being completed

A SURVEY OF PROJECTED U. S. PULP EXPANSION

(By the United States Pulp Producers Association)
Yearly Pulp Producing Capacity in Tons

	1947	1948
Total Sulfite	2,891,942	2,855,221
Maximum Bleaching	1,964,237	1,942,815
Total Sulfate	5,495,495	6,466,353
Maximum Bleaching	1,413,396	1,559,509
Soda	504,801	538,424
Semicchemical and Chemfibre	481,659	577,574
Groundwood	2,446,116	2,579,716
Defibrated and Exploded	385,069	380,124
Asplund and Exploded	601,769	671,074
Chemipulp	243,000	259,050
Screenings	74,029	75,707
TOTAL	17,031,513	18,455,567
By Regions:	1947	1948
New England	1,604,504	1,667,964
Mid-Atlantic	1,143,223	1,172,155
Lake States	1,842,292	1,894,650
Pacific Coast	2,175,078	2,334,997
South	6,024,014	6,953,353
TOTAL	12,789,111	14,023,119

Note—The above projected capacity data for 1948 is strikingly similar to the figures arrived at independently by PULP & PAPER in its own survey published on this page.

on the glassine conversion of Sonoco Products, Rockingham, N. C.

Byron, Weston Co., Dalton, Mass., completed the modernization of its paper machines and plant addition for new finishing equipment.

St. Regis has completed the jump from 80,000 to 110,000 tons annually at the Deferiet, N. Y., mill. Eastman Kodak has added its machine at Rochester. At last report, the \$400,000 program at Hinde & Dauche was still lively.

Oxford Paper Co., Rumford, Me., is moving toward completion on its sizable expansion which includes a new machine and preparations for streamline machine coating. Also in the Maine area, S. D. Warren Co., Cumberland Mills, has completed its new and modern recovery system.

Sales of small paper mills in New England due to the pinch of the pulp shortage did not come to reality as predicted in some quarters, although some were admittedly facing difficulties. But by and large the non-integrated small mills of the East were "piecing it out" with domestic and foreign pulps and, in some cases, with reclaimed paper.

No new mills or expansions have been announced for the area as we go to press, but one overlaying factor is important in a consideration of expansion in the eastern seaboard area and particularly in the New York and New England area. That is the fact that many mills in this area are outmoded in the competition to come and face modernization and re-engineering on many fronts.

MIDDLE WEST EXPANSION

Middle West expansion has bulged pretty heavily into 1948. Starting up this spring in Ohio were the new 175-inch Fourdrinier at Chillicothe Paper Co., increasing that mill's output by 60%, and the new rebuilt machine for American Envelope Co., moved from Miamisburg to West Carrollton, and doubling fine papers

production to 70 tons for that company. This is the new Moraine Paper Co., first new fine paper mill in the U. S. in a quarter century.

Rhinelander Paper Co. was pushing along work on a new No. 7 machine, which will be a twin brother of the "Big Swede" — the giant glassine machine

which went into production in 1942. The Lake State's sulfite industry was launching a new yeast plant using effluent at Rhinelander this summer.

Marathon Corp.'s additions included a magnificent new carton plant at Menasha, Wis., and a new 136-inch Yankee Fourdrinier at Menominee, Mich.

Hammermill Paper Co. is carrying out a many-sided expansion at Erie, Pa., with the key unit a new Rice, Barton paper machine.

A case of a company which has taken a second look at a program and withdrawn part of it is St. Regis Paper Co. at Kalamazoo, Mich., where a power project planned under a previous ownership was pigeonholed.

A modern new plant at Biron, Wis., housing the fourth machine at that mill for Consolidated Water Power & Paper Co., and 14th machine for the four mills of that company, started up last year. The machine, 152 inches, is listed for 125 tons a day capacity.

Consolidated got started early in expansion of its operations, with the purchase of the Wisconsin River Paper Co., and conversion of its two former newsprint machines to book paper.

Kimberly-Clark Corp. announced that its new two-machine book paper mill addition at Niagara, Wis., would begin operations this spring.

"This is the second full year of Kimberly-Clark's expansion," said the company report. "The new machine and the major addition to the Lakeview mill at Neenah, Wis., which was placed in operation last spring, made a major contribution to volume for the balance of 1947." The report noted that 140 tons of bleached sulfate pulp would be purchased from the Coosa River Newsprint Co. mill to be built and operated by K-C in Alabama and that more sulfate pulp would be forthcoming from LongLac in Ontario in early 1949.

Mead Corp. reported the rebuilding and speeding up of No. 7 machine at Chillicothe, O., the erection of a new 3-stage bleach plant for No. 2 soda mill; a new Fourdrinier for No. 1 machine.

Mead also reported the rebuilding of No. 1 machine at Escanaba, Mich., and its conversion to machine coated papers. More finishing equipment at the Kingsport, Tenn., mill, and woodroom improvements at Sylva, N. C. Mead's major Southern expansion is reported elsewhere in this section.

This spring also brought in the new No. 10 paper machine at Thilmany Pulp & Paper Co., Kaukauna, Wis., adding 35 tons a day to that mill's kraft output. A new boiler, a new Venturi scrubber type of gas washer, a new Fourdrinier for No. 8 machine are among other improvements at Thilmany.

Over \$1,750,000 is being invested in new machinery and improvements at Combined Locks Paper Co., Combined Locks, Wis. A new No. 1A paper machine, replacing an old one, is expected to increase production about 20 tons per day.

In the board field, the two most notable

additions in the Middle West, and perhaps in the entire country, are those effected at Alton Box Board Co., Alton, Ill., last year, and being effected this year at Michigan Carton Co., Battle Creek, Mich.

At Alton, reputedly the widest and longest paperboard machine in the world—216 inches wide and with seven cylinders, has gone into production. Another mammoth board machine, likewise outstanding in several respects, will be going into production at Michigan Carton Co.

Although there is not a great deal to report about additional tonnage in the Middle West, many mills in that region are making improvements and going into higher quality papers. Fine new bleach plants, besides those already mentioned, have been installed by Minnesota & Ontario Paper Co., The Northwest Paper Co. and Nekoosa-Edwards Paper Co. and the Blandin Paper Co. These mills have made other improvements in finishing, on machines, etc.

EXPANSION IN THE SOUTH

While the end of 1947 and early months of 1948 found Southern production of both pulp and paper increased by the advent of new mills at Pensacola, Fla., Palatka, Fla., Macon, Ga., and Iberia, La., and a new machine at Lufkin, Tex., and Savannah, Ga., the bulk of new expansion was still to be felt this year. And instead of levelling out, there are prospects of still added production to come.

In the past year, new paper mill projects definitely beginning to take shape indicate a possibility of a further boost of anywhere from 600 to 900 tons of wood pulping capacity over plans already announced.

Strikingly emphasizing the movement of the industry South was the removal by Champion Paper & Fibre Co. of a Fourdrinier machine from Hamilton, O., to Pasadena, Tex. This machine has bettered its record in the old location, and the mill now produces slightly better than 400 tons of paper daily. Champion has an assured pulpwood supply.

Formerly the Pasadena mill produced more pulp than its one machine needed for furnish, the balance being sold.

This was also true of Southland Paper Mill, Lufkin, Tex., which started its newsprint production with outside pulp for blending with its groundwood. It then built a pulp mill with extra capacity and sold pulp. Now, with its second newsprint machine in operation, it, too, is out of the market.

With these two Texas sources of wood pulp dried up, it is thought highly probable that other industry units in that state will install their own pulp mills. These include Orange Pulp & Paper Mill at Orange, and Fleming & Sons at Dallas. The Orange pulp mill was closed out years ago.

It is expected that the stabilization of water supply through the construction of U. S. dams on the Angelina and Neches rivers will result in the erection of another mill.

Across the Sabine River in Louisiana, the old Calcasieu Paper Co. mill at Elizabeth is reported to have completed engineering work for a new mill. This company was acquired by the same ownership as Jacksonville Paper Co. which first erected a modern 35-machine bag plant. The new mill will have a 1500-foot 160-inch trim machine. Upon its completion, the old machine will be moved over, giving the owners a two-machine mill.

Southern Advance Bag & Paper Co. (Hodge, La.) has been modernizing, resulting in greater capacity and a machine speeded up with a new drive. Its super-sonic drying installation will be completed by summer's end. Brown Paper Mill Co., Monroe, La., has a green light from state authorities for ad valorum tax exemption on \$4,500,000 of improvements. Much of the pulp making end of this has been completed.

As previously reported, International Paper has been carrying out a major expansion at the Southern Kraft Division mills. The new mill at Bastrop, with its 2000-foot paper machine, will be completed soon. Work is well advanced at Camden, Ark., Springhill, La., Moss Point, Miss., Mobile, Ala., and Panama City, Fla.

In Mobile, Ala., Hollingsworth & Whitney's mill is spending a substantial sum to improve and enlarge its water supply. Mobile Paper Co. has brought its additional paper machine into production.

Crossett Paper Mill division of Crossett Industries, Crossett, Ark., is pushing its previously announced program to keep its operations abreast of technical advancement. Improvements at Gaylord Container Corp., Bogalusa, La., has been completed.

At Tuscaloosa, Ala., Gulf States Paper Corp. may have its new 1800-foot-per-minute paper mill in; other equipment ready for production. At the Childersburg Arsenal site (Ala.) the Coosa River Newsprint Co. is breaking ground for its new mill which, in addition to newsprint for southern publishers, will furnish pulp for Kimberly-Clark's two new wadding machines in the Memphis, Tenn., plant.

In western Florida, Alabama Pulp & Paper mill blew its first digester March 11. Across the company road, Florida Pulp & Paper had already preened its production upwards with new, modern equipment.

Over in Georgia the newest announced mill is the 65-ton project of Carolina Paper Board Co., which will be located 20 miles from Atlanta, at Austell from which community the operating subsidiary will derive its name.

There exists a good bit of quietude about the projected mill at Bainbridge, where Magnolia Timber & Development Corp. controls enough forest land for a mill; about Valdosta, where St. Regis' lease of Superior Pine Products land can supply a mill; and Foley, Fla., where Brooks-Scanlon, Inc., controls an excel-

lent situation. Rayonier is spending \$4,000,000 to improve quality.

At Macon, Ga., Macon Kraft Corp., owned by Inland Container Corp. and The Mead Corp. (Macon Kraft Corp.) is ready to go and the new wall board mill—pulpwood user—of Armstrong Cork is already in production.

Union Bag & Paper Corp., at Savannah, has its production of paper already upped 25% by its new machine. At nearby Port Wentworth, Southern Paperboard (Robert Gair, Inc., subsidiary) will be counted among the producers this year. St. Mary's Kraft is completing its expansion, which has been substantial.

Container Corp. of America has upped its Fernandina (Fla.) pulp mill capacity a third and will soon operate its new paper machine there.

In the Savannah and Jacksonville areas expansion programs—in existing mills—would total approximately \$30,000,000, exclusive of the Union Bag & Paper Company improvements at Savannah.

National Container at Jacksonville has a several million dollar program under way which includes additional washers in a new building constructed to house the old washers, as well; and at National Container of Virginia, at Big Island, the new semi-chemical plant has been finished.

New construction along many lines is going forward at Brunswick Pulp & Paper Company, Brunswick, Ga. These include new railway spur line, woodyard conveyors, new chipper, new barking drum, lime kiln, and chip bin and digester additions. The new bleach plant is now in operation.

Farther up the Atlantic coast, West Virginia Pulp & Paper Co. doubled its production in 1947 with a new, fast machine with everything that goes with it. The Georgetown, S. C., mill was one of the first to get a boost from International Paper Co.'s program for a 25% increased production with a new machine. Sonoco

SURVEY OF U. S. MILLS' PAPERMAKING CAPACITY - ANNUAL BASIS

IN TONS

(Made by American Paper & Pulp Assn., its Divisions and National Paperboard Assn.)

	CAPACITY 12/31/45	CAPACITY 1946	INCREASES DURING 1947	1948	TOTAL CAPACITY 12/31/48
FINE	1,168,760	1,240	93,930	27,590	1,291,520
BOOK	1,947,770	72,230	177,320	220,410	2,417,730
TISSUE	1,114,970	35,030	91,140	77,500	1,318,640
WRAPPING	3,233,260	16,740	194,370	319,300	3,763,670
GROUNDWOOD	773,420	36,580	27,900	8,370	846,270
NEWSPRINT.	876,350	-26,350	-18,600	13,950	845,350
MISCELLANEOUS. . .	107,520	2,480	930	..	110,930
BUILDING PAPER .	1,160,000	..	..	..	1,160,000
TOTAL PAPER. . .	10,382,050	137,950	566,990	667,120	11,754,110
TOTAL PAPERBOARD	9,000,000	..	370,100	1,040,850	10,410,950
BUILDING BOARD .	900,000	..	418,500	57,350	1,375,850
GRAND TOTAL .	20,282,050	137,950	1,355,590	1,765,320	23,540,910

Products at Hartsville has its eighth machine and new pulp making plant about in hand.

The smaller mills of Tennessee's mountains have kept up by making improvements in proportion to their capacity and the forest situation they experience.

in its history, plans a multi-million dollar wood fiber hardboard operation with a plant near Ukiah, Calif.

U. S. Gypsum Co. in Los Angeles has added a giant Downington 160-in. 200-ton a day board machine. The Flintkote Co. in Los Angeles added to wast paper pulping capacity and made many improvements. Standard Gypsum has assembled used machinery at Long Beach, Calif., for a new mill.

A new board mill of Angelus Paperbox Co., rated at 60 tons a day, has pushed output to 92 tons. Container Corp. of America has pushed 9-point board production on its two machines at the former Calif.-Ore. mill in Los Angeles to 70 tons. Parrafine Cos. are expanding felt and other production at Emeryville, Calif., at cost of \$4,000,000.

A many-sided program of expansion was still in full swing at the Camas, Wash., mill of Crown Zellerbach Corp., which has been described as the biggest "specialty" mill in the world. This mill, with sulfate, sulfite and groundwood products of all kinds, was producing at the rate of 480 tons per day of a year ago. Since that time the new Yankee facial type tissue machine went into production adding 20 tons more per day. An additional increase of 125 tons per day was being effected with installation of the "all-purpose" No. 15 machine, which started up April 18. The new 150-

FAR WESTERN EXPANSION

A great portion of the Pacific Coast expansion was still being completed this year with much work carrying over in 1949. At least two big Northern mills may make new announcements of additions to digester capacity in another year.

Plenty of activity has been taking place in California with the Fernstrom Mills of Pomona, Calif., starting up an entirely new mill this spring, its first addition since 1926-28 installations. A new high speed flat tissue machine will probably almost double present mill capacity of 50 tons of wrap and tissue.

For the first time since the early years of the Pacific Coast industry, California will re-enter the ranks of pulp-making states, with three new wood pulp and board mills planned in the northern part of the state.

Fibreboard Products, Inc., had steel-work up and foundations in for a 260-ton two-machine mill at East Antioch,

Calif., with a kraft pulp mill and semi-chemical pulp mill. The mill is being built on what engineers describe as solid sand, without piling. Chips from California sawmills will be stored in an open pit.

Other Fibreboard mills on the Pacific Coast from Port Angeles, Wash., to the Los Angeles area have also participated in the announced \$24,000,000 Fibreboard expansion, with added finishing facilities, power supply, etc.

A few miles north of Sacramento, the Newsom Kraft Corp., another pulp and board mill to cost \$17,000,000 is projected. K. K. Newsom of San Francisco and Benjamin N. Rosenbaum of New York are organizing this company which Mr. Newsom said has access to 3 billion ft. of timber and may make up to 500 tons of board.

Masonite Corp., branching out from its Laurel, Miss., operations for the first time

ton sulfate bleach plant went into production in March this year.

The Crown Zellerbach expansion at West Linn, Ore., is largely completed, including addition of one machine and rebuilding an old machine, both making machine coated paper, for Time, Inc., and Curtis Publishing Co. Other machines were being speeded up. The increased production resulting from this program has been about 110 tons per day.

A new multi-wall bag plant was being constructed this spring at Crown Z's Port Townsend, Wash., mill to be equipped with two multi-wall bag machines, four-color printing press and auxiliary equipment. The wet machines moved to Port Townsend from West Linn are converting excess pulp capacity of this kraft paper mill to wet lap. New wood room, and screening equipment will add to the mill's flexibility.

A new packaging research laboratory constructed at San Leandro, Calif., by Western Waxed Paper Co., Division of Crown Zellerbach. Construction under way for complete new plant at San Leandro to house the operation now being conducted at Emeryville, Calif. Western Waxed Paper Co., North Portland, Ore., has completed a new building for a gummed tape plant and new machine room.

Plant facilities of the new 200-ton bleached sulfate pulp plant of Weyerhaeuser Timber Co., Pulp Division, Longview, Wash., are nearly completed. Production is expected to start in July. At about the same time the new mill is started, it is planned that the company will convert over from the sulfur-lime-rock chemical process to the MgO process in the sulfite mill at Longview.

Construction has been started on the new 150-ton Weyerhaeuser sulfate plant at Springfield, Ore., which will make container board in rolls. This mill will get into production in 1949.

The Longview Fibre Co. plant at Los Angeles, Calif., now under construction, is to go into production of corrugated box during month of June. Container board for this plant will be supplied from the company's Longview, Wash., mill, where new steam and electric facilities are under construction, enabling possible production of up to 550 tons per day of board, paper and converted products without reliance on outside source of steam or power. The power program will be completed by the middle of 1949. For the past year the company has been working on design of a hydraulic slab barker, which is now about ready to go into operation.

Hawley Pulp & Paper Co., Oregon City, Ore., has during the past year installed a Sumner 110-inch chipper and general wood mill improvements, and since its sale to Los Angeles and Salt Lake paper and affiliated owners, it will convert all production to newsprint.

Three Rayonier mills on the Olympic Peninsula have been balancing their operations and Everett Pulp & Paper Co. has made improvements including a new furnace and washers.

With many improvements, Soundview

Pulp Co. has stepped production up substantially to over 550 tons.

The long-planned 240-ton paper mill and bag plant facilities being added to its 300-ton kraft pulp mill at Tacoma, Wash., by St. Regis Paper Co., is not likely to get into production until the spring of 1949.

At Bellingham, Wash., a Paperboard Division of Puget Sound Pulp & Timber Co. started up last year with rated capacity of 40 tons daily of containerboard, and this year the Lignosite Division was added, making a light-colored plastic powder for use in building materials or as a binder. This and the Alcohol Division's ethyl alcohol are processed from the non-cellulose mill effluent. The mill makes 360 tons per day of sulfite pulp.

At Shelton, Wash., Simpson Logging Co., a new insulation board plant making up to 300,000 bd. ft. daily, using entirely wood "left-overs" from company sawmills and a plywood plant, started up a year ago.

Also at that time, the long-idle West Tacoma, Wash., mill, modernized by a group of newspaper owners, the West Tacoma Newsprint Co., started up shooting for a capacity of 50 tons daily.

A parchment machine and printing presses from a Los Angeles mill which its owners sold were moved to Columbia River Paper Mills at Vancouver, Wash.

Fir-Tex Insulating Board Co., St. Helens, Ore., has increased plant production of insulating board about 10% during the past year largely through intensified maintenance program and improving manufacturing schedules. It is contemplated that another 10% increase will be obtained by end of this year.

Spaulding Pulp & Paper Co. at New-

burg, Ore., which had change of ownership a little over a year ago, has in past year increased its production to 110 tons per day by the installation of another digester. Currently the company is putting in an acid accumulator and plans a new woodroom and additional dryer rolls, which will increase output another 15 tons.

Bemis Bag Co., St. Helens, Ore., will start moving its plant in May to the company's new plant building at Vancouver, Wash. The entire operation is to be moved to Vancouver and additional equipment will increase output 60%.

Plans for 1949 at St. Helens Pulp & Paper Co., St. Helens, Ore., includes installation of one additional bleach stage, using an Impco high density tower and 8 by 10 rubber-covered washer with auxiliary Impco equipment, making a total of three bleach stages in the company's paper manufacture. This will result in improved bleach paper.

Pacific Paperboard Co., Longview, Wash., during the past year has placed in operation machine No. 4, making newsprint at rate of 20 tons per day. Subsequently this machine will make board, which will increase capacity to 40 tons. The company is currently working on installation of a new Moore & White 160" newsprint machine producing 40,000-45,000 tons per year, starting next winter. An increase of 10% has been obtained during the past year from other machines.

The company's previously announced 125-ton plant to be built at San Bernardino, Calif., the Paperboard Co., with a 122-in. cylinder machine, will be delayed for a year pending completion of the newsprint machine at Longview.

EXPANSION IN CANADA

Expansion is still the prevailing mood in Canada's pulp and paper industry, despite the fact that last year set new production records all down the line.

Apart from the conventional workings of the law of supply and demand, expansion in Canada's pulp and paper industry has been given additional impetus as a result of the economic situation that materialized during the closing months of 1947 and which produced additional incentive for building up exports to the United States.

The traditional, pre-war trading setup from which Canada benefited for many years—the three-way circuit between Canada, the United States and the United Kingdom—was dislocated when Britain ran short of dollars and found herself unable to continue paying for goods exported to her from Canada. Canada's national economic policy, swiftly re-cast to meet this situation, was to encourage manufacturing in Canada and exports, especially to the United States. Because of the special economic importance of the industry at this time, the Canadian government has encouraged expansion and while some other lines of production of less significance in the present scheme

of things may have encountered delays in getting approval for required materials and machines for new construction, the "go" signal has continued to flash for the pulp and paper industry.

The most spectacular new developments of the past few months have been in the far West, for British Columbia leads all the provinces in the number of new mills planned and capital invested. Improvements being carried out at existing mills in British Columbia, coupled with the amounts to be spent by new companies represent a total investment of over \$85,000,000.

The past year was marked by entry of the new Port Alberni kraft mill at Bloedel, Stewart & Welch, Ltd., into the ranks of producers. But Vancouver Island is to have two more big mills, both of them depending to a large extent, as is the Bloedel mill, on slabs, small logs and other "left over" wood materials. A \$12,000,000 mill is to be built by the H. R. MacMillan Export Co., which has hitherto been interested only in lumber and plywood. Another is planned by Canadian Western Lumber Co. at Duncan Bay, near the mouth of Campbell River, source of power for the Bloedel mill. Ground clear-

ing and excavation for Columbia Cellulose Co.'s high grade sulfite mill at Port Edward, near Prince Rupert, were completed this spring.

The present year will probably see a beginning of other projects in the west coast province. Minister of Lands and Forests E. T. Kenney announced recently that the province could support at least 15 pulp mills and he indicated inquiries had been received relating to proposed mills in the Cariboo district and near the Arrow Lakes, where the government plans a new hydro development.

Operating mills in British Columbia have been installing new equipment. Powell River Co., having revolutionized its wood-handling facilities with the installation of hydraulic barkers and new chippers, is one of the few companies in the industry that will install a new newsprint machine this year. This will be No. 8 machine, to go into production during the third quarter of 1948. The company has also added to its power facilities.

Pacific Mills, Ltd., has carried out important improvements at its Ocean Falls mill and Vancouver converting plant. New 3½-ton rotary digesters were recently set up, following the installation of new boilers and turbo-generators and a zinc hydrosulfite bleaching and washing system, as well as a new Dorr continuous causticizing system.

Sorg Pulp Co., the first western pulp mill with a block pile, is increasing its pulp capacity by 40% or 45,000 tons at Port Mellon. The company's \$2,000,000 expansion program will be completed this summer. Sidney Roofing & Paper Co. at Victoria has placed an additional paperboard machine in operation.

Westminster Paper Co. at New Westminster saw its new Beloit machine and auxiliary units in operation during the past year, virtually doubling the mill's capacity, and a groundwood mill has been added.

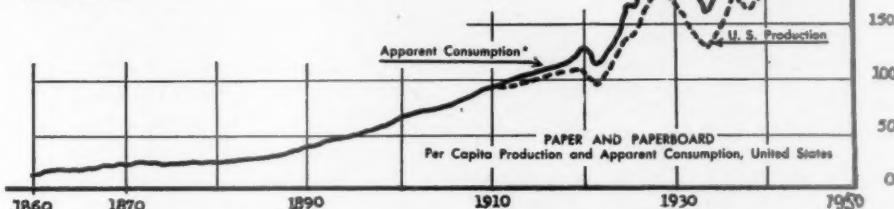
B. C. Pulp & Paper Co. has been making far-reaching changes at both its mills—at Woodfibre and Port Alice. Steam and power facilities have been modernized and three new integral furnace boilers, each with a capacity of 100,000 h.p. per hour, have been installed.

If Alberta gets the \$14,000,000 pulpnewsprint mill near Edmonton for which R. O. Sweezey, Montreal financier, is negotiating, it will be the first to be built in Canada's "foothill province." Spruce and jackpine from crown timberlands would supply most of the raw material. It is understood that the Sweezey interests are hoping to underwrite the project by sale of stock to prospective consumers of the newsprint.

Saskatchewan is another Canadian province that is flirting for the first time with the idea of establishing a pulp and paper industry. If such materializes, the mill may be operated as a government enterprise, because the C.C.F. (Co-operative Commonwealth Federation) party is in power there and it believes in Socialist control. However, this is by no means a certainty as several private groups are reported to have shown an

THIS CHART SHOWS PER CAPITA PAPER PRODUCTION AND CONSUMPTION in the United States has virtually sky-rocketed upward since the early 1930's. Production reached about 300 lbs. per person in 1947, where the lines end. Apparent consumption was about 350 lbs., which, of course, includes newsprint imported from Canada. Further rapid increases to 1950—if there is no war—have been predicted.

* Apparent consumption is production plus imports less exports.



interest in pulpwood stands.

Manitoba has one substantial pulp and paper mill, at Pine Falls, operated by Manitoba Paper Co., a subsidiary of Abitibi Power & Paper Co., where expansion has boosted production from 300 to 400 tons daily.

At the Head of the Lakes in Fort William, Great Lakes Paper Co. is currently spending about \$500,000 on additional sulfite pulp digester capacity. Steps are also being made to speed up the paper machines, including the world's widest (304 inches). There has been talk to the effect that Great Lakes plans a large kraft pulp mill near Fort William but company officials say plans have not been determined.

Along the northern shore of Lake Superior, an area which in the past three years has taken most of the spotlight on the Canadian development stage, Brompton Pulp & Paper Co.'s Red Rock mill and Marathon Paper Mills of Canada's mill at Marathon have settled down to full production. The newcomer in this region is LongLac Pulp & Paper Co., a subsidiary of Kimberly-Clark Corp., at Terrace Bay, where upwards of \$40,000,000 is being spent by the company and Ontario Hydro, together, in harnessing Aguasabon River power and in building a 300-ton bleached sulfate mill.

An influence in promoting more new pulp and paper mill construction in Ontario is the government's policy to curtail pulpwood exports, as announced last fall by Premier George Drew.

One western Ontario mill that has seen some expansion during the past year is Dryden Paper Co. at Dryden, close to the Manitoba border, where the bag plant's capacity is being increased and kraft production has been doubled.

During the past year KVP Co. Ltd., subsidiary of Kalamazoo Vegetable Parchment Co., at Espanola, Ont., carried its diversification program a step farther by placing two rehabilitated paper machines into production of newsprint and specialty wrapping paper.

Abitibi Power & Paper Co. has been enlarging its operations at several mills, most of the work being carried out so far at Smooth Rock Falls, Sturgeon Falls and Thunder Bay (Port Arthur).

The Austin Co. of Cleveland has been commissioned to make an survey of Abitibi's mill at Salt Ste Marie with a view

to expansion with a possible 200-ton kraft mill there.

In Quebec, many of the larger mills have undergone modernization with new equipment, but there have been few notable new developments. Howard Smith Paper Mills has its new \$325,000 plant in operation at Ville LaSalle, producing arborite, building material developed at the Cornwall mill.

Up at Nairn's Falls, Clermont, Que., Donohue Brothers have installed a new battery of grinders to boost production of newsprint and pulp. Canada Paper Co. at Windsor Mills plans expansion and modernization at a cost of several million dollars over the next few years. The mill of the Quebec Pulp & Paper Co. at Chicoctimi, which may be brought into production if present negotiations materialize, with Bathurst Power & Paper Co. in control.

Some of the major companies that have shared to greater or less degree in recent expansion are Canadian International, Consolidated, St. Lawrence, Quebec North Shore, Ontario and Brown Corp.

In New Brunswick, the Fraser Companies will have their new 120-ton kraft mill at Newcastle in operation early next year. The St. George Pulp & Paper Co. mill at St. George, N. B., has been rebuilt.

In recent months there has been a good deal of speculation, but not much definite news, concerning the proposed \$65,000,000 newsprint mill at Lepreau on the Bay of Fundy, N. B. E. C. Atkinson of Fredericton, N. B., is one of the promoters of this enterprise and he has been obtaining stock subscriptions from some United States publishers.

Both the big Newfoundland operations, Bowater's Newfoundland Paper Mills at Corner Brook and Anglo-Newfoundland Development at Grand Falls, are engaged in expansion, the former installing a new newsprint machine and the latter carrying out a program designed to increase newsprint to 200,000 tons annually. Bowaters has also built a new groundwood mill.

Bowaters last year had staff men surveying possibilities in British Columbia as well as in the Southern states. British Columbia officials would not be surprised if the big Newfoundland enterprise, controlled by British capital, decided to build a mill on the west coast.

Nine New Pulp and Paper Mills EXPANSION IN MEXICO

EXPANSION of the pulp and paper industry in Mexico has largely taken place in the last few years and is still going. To see the new mills and to obtain first hand news of this expansion, **PULP & PAPER** has made an on-the-spot survey of the industry south of the Rio Grande. Not many North Americans know that a paper just as good as the Chinese could have made 1600 or 1700 years ago, was being made in Mexico by the Mayan tribes, almost, if not as long ago. When our historians say the Chinese "invented" paper it is hardly short of slander against the ancient civilizations of Mexico—the Mayans and Aztecs—who beat a paper

out of the cooked or soaked fibers of the fig and mulberry trees of Mexico without anybody else teaching them how. This type of paper is still made by several Mexican tribes.

And the Spaniards brought paper-making from Europe to Culhuacan, Mexico, way back in 1575, which was more than 100 years before the famous Rittenhouse mill started up in Philadelphia—and which is sometimes carelessly credited with being the first paper mill in America.

Total wood pulp production in Mexico was only 18,636 tons in 1937. It was 27,010 tons in 1946, according to figures

gathered by the U. S. embassy. It was estimated that production increased 56,800 tons in 1947, with 33,900 tons in the new booming kraft pulp industry.

But when the pulp capacity which is now newly installed or is being installed this year and next, gets into production, Mexico should be making 152,000 tons of pulp. Of this, 87,000 tons would be kraft pulp. This is an estimate made as result of the survey by **PULP & PAPER**, on the basis of actual visits to most of these mills by an editor.

In papermaking, the U. S. embassy surveys (which have been the only statistics gathered on this industry in Mex-

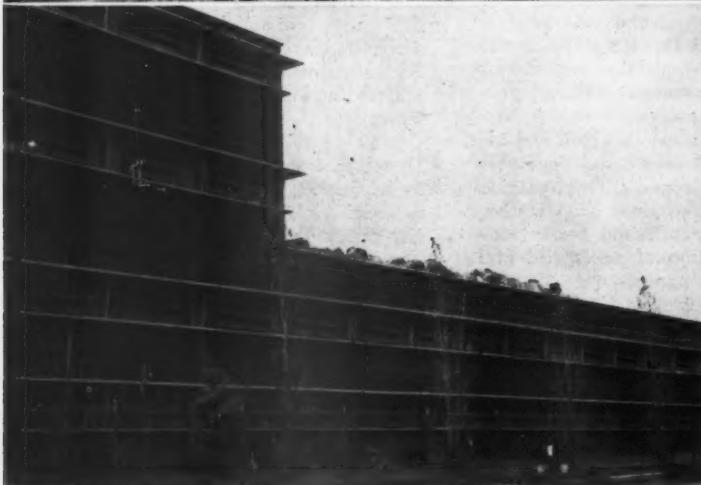
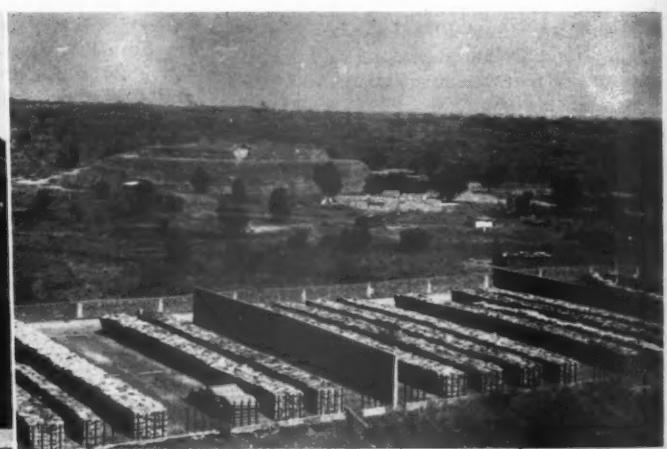
PHOTOS TAKEN ON TOUR OF MEXICAN MILLS BY PULP & PAPER EDITOR:

Top (left) — New Papelera Nacional, S. A. (PANASA), a model plant to make cigaret or fine papers on two rebuilt machines from U. S. in new industrial city of Tlalnepantla, 8 mi. northwest of Mexico City. Group headed by Jose de la Macorra Jr., with Westinghouse, steel, tool, fertilizer and other industries participating, are building \$60,000,000 town (not counting cost of plants.)

Top (right) — Aztec pyramid beyond storage yard for pulpwood at Pena Pobre kraft pulp mill. This is one of two plants operated by Lenz family, which is now building third paper mill. Note fire walls between stacks of wood, re-

quired under insurance agreement. "Pena Pobre" means "poor rock" and refers to lava-covered valley shown in this picture, at southern outskirts of Mexico City. Lower left — New pulp mill of Empaques de Carton Titan, S. A., Monterrey, Mexico, owned by Cuauhtemoc brewery, second biggest brewery in North America. Note wheat straw showing on roof of lower section of building. Bamboo is used for liner; wheat straw for corrugated.

Lower right—Snow-capped peak of Mount Colima beyond a forest of virgin pine now being cut selectively to serve new Atenquique kraft mill (a complete illustrated description of this mill was published in our May issue).



PHOTOS TAKEN BY PULP & PAPER on tour of Mexico:

Above—CARMEN BADIA OLMEDO, who for several years ran Negociacion Papelera Mexicana, S. A., after death of her father, Juan Badia, in 1936. Her husband is now President of the company. But she still takes an active part in management. At left, her younger brother, JUAN BADIA Jr. Picture taken at the mill.

Middle (left)—One of the colorful shrines of saints which are seen in many machine rooms. This one is in Fabrica de Papel Coyoacan. The patron saint of papermakers is Santa Lucia.

Middle (right)—In all the mills in Mexico where employees bring their lunches, their wives make for them hand-crocheted lace scarfs such as is shown on this man's lunch basket. The men are proud of their wives' handiwork.

Below—A picture indicating the size of some of pine pulpwood being cut in Mexico. Note Mercury power saw in lower left corner of this picture.

ico) showed paper production of only 138,800 tons in 1947.

According to checks made with virtually all Mexican producers at their mills by PULP & PAPER, the expansion now being carried out will bring this paper production to 241,000 tons. About one-third is paperboard and two-thirds paper. The Mexican government has placed a tariff barrier against imports of kraft board and it is inclined to invoke protective tariffs for other products of new paper mills in that country.

An important point about Mexico is that for a population of only about 20,000,000 persons, and only a very small percentage of that population using very much paper, each mill has had to make a wide variety of papers. This holds down production totals, for one thing. The big San Rafael mill, for example, makes 90 different kinds of paper!

Cia. Industrial de Atenquique is the first really volume production mill built in Mexico, with mass production of only kraft pulp and a few grades of paper. More may come as the government stimulates greater self-sufficiency with its tariff decrees. But this year, Mexico will still have to import about 60,000 to 80,000 tons of pulp. And three new rayon plants will want another 8,000 tons or more.

And despite the efforts to build up Mexico's own industry, there will still be a substantial amount of paper imports—it is estimated 130 tons were imported in 1947. All Mexico's newsprint is imported, which totaled 80,000 tons last year.

In the pulpwood section of this issue is a discussion of the timber resources of Mexico upon which it is building its burgeoning pulp industry.

Biggest Mill at San Rafael

The biggest pulp and paper industry in Mexico is Cia. de las Fabricas de Papel de San Rafael y Anexas, S. A., with mills at San Rafael, 35 miles southeast of Mexico City, and at Progreso, 25 miles northwest of the capital. Jose de la Macorra, Jr., like his father before him, is the general manager. He has effected expansion at San Rafael which this year is to bring into production a 60-ton kraft pulp mill, in addition to groundwood,



sulfite and semi-chemical facilities producing around 100 tons daily. A new Yankee Fourdrinier, making 50 tons a day, has just been installed, and now San Rafael has ten machines making about 250 tons.

El Progreso is the fine paper quality mill of the San Rafael company, and it has two machines making 60 tons daily—a new one installed last year took the place of the two small ones.

Sr. Macorra is also head of two other separately organized companies which have built two entirely new paper mills, with only a wall between them, at a new industrial city, Tlalnepantla, eight miles northwest of Mexico City. One company is Papelera Nacional, S. A., with a 300 ft. long board machine capable of making at least 40 tons daily. The other is Cartonera Nacional, S. A., with two small machines for fine or cigaret papers, or both, making 14 tons. A flax cellulose plant will serve them.

One of the most widely discussed new mills in Mexico is Cia. Industrial de Atenuque, a modern kraft pulp and paper mill of 80 tons capacity but which, in a year and a half of operation has frequently been pushed up to 130 tons by the ex-Southern Kraft operators. Now owned by the government, it was built on a government loan by the late Enrique Anis, industrial promoter of Guadalajara.

In Monterrey, which the guide books call "Mexico's Pittsburgh" (if so, it's a non-smoky and bright one) there has been quite a development. There the Garza brothers, long prominent in lumbering, have installed a two-machine paper mill to make 80 tons a day by the end of 1948 and next year plan a kraft pulp mill of similar capacity.

Cerveceria Cuauhtemoc, next to Budweiser the biggest brewery in North America, has decided to make its pulp as well as board for beer cases (and it has its glass, steel, and bottle cap plants, too). Its subsidiary, Empaques de Carton Titan, has started up a new 26-ton alkaline mill using bamboo from its own bamboo farms and wheat straw and it has a Fourdrinier and is in the market for a cylinder machine. It is already selling board to other customers.

Fabrica de Papel Monterrey, with two cylinder machines, making 10 tons, is the other Monterrey mill. Chihuahua, also in the north, has a 35-ton mill, and one at Laredo is making 40 tons.

The greatest development in the industry has been in the environs of Mexico City. We have already mentioned the San Rafael mills and the two new companies headed by Sr. Macorra.

Lenz Mills Outstanding

Another outstanding company is that headed by active 81-year-old German-born Don Alberto Lenz, assisted by his three sons. This company is Las Fabricas de Papel Loreto y Pena Pobre, with two mills located in the southern suburbs of the capital. At Loreto, a new complete paper mill is being built for a

modern 134-in. 27-ton capacity fine paper machine. There are two machines there now and three paper machines at Pena Pobre, making about 70 tons daily; also a 25-ton groundwood mill at Laredo and 35-ton kraft mill at Pena Pobre, but the latter is being extensively improved with new boiler capacity projected.

At Coyoacan, south of Mexico City seven miles, is a 40-ton paper mill and 12-ton groundwood mill, Fabrica de Papel Coyoacan, headed by Don Tomas Mier. The third machine went into production in 1943 and many improvements are now being made, with possibly further expansion.

There are two more spanking new mills on the northern city limits of Mexico City. Compania Papelera el Fenix, S. A., an entirely new plant, has just installed a second hand Fourdrinier making up to 25 tons of board. Fenix's cylinder machine from an old mill is going to be moved alongside and a 10-ton groundwood mill has been installed.

Cartonera Moderna, S. A., also known as Hijos (Sons) de Jose Ribot, S. A., with Don Felix Ribot, eldest son of the founder now president, suffered growing pains down in the old workers' quarter of Mexico City. It has built a new plant. Two machines are being stepped up with additional equipment from 14 tons daily of light board to 27 tons and a third machine will be purchased in about two years, said Don Felix.

Near the new Ribot premises on northern city boundary is Negociacion Papelera Mexicana, S. A., also known as Papel Badia. This mill added small machines brought from the U. S. in 1943 and 1945, stepping up production from 22 to 32 tons. Senora Carmen Badia Olmeda ran this mill after her father died and after her marriage to Prof. Olmeda of the University of Mexico, she continued to take an active part with him in management.

"La Aurora," S. A., headed by French-born Alphonse Desdier, and his German-born brother-in-law, H. Carlos Kinkel, is streamlining its operations, with its envelope plant, school and office papers supply and other affiliated plants moving under one roof. Groundwood and paper, 12 tons each, are made.

Seven miles north of Mexico City the first facial tissue ever made in Mexico—just four or five tons a day—is a new development this year. This is the new Fabrica de Papeles Faciales y Sanitarios de Mexico, S. A., situated alongside the jointly owned La Cartonera Industrial, S. A., which makes industrial board.

United Shoe & Leather Co., S. A., an old-time Mexican concern with no affiliation abroad, has started a new paper division because it had difficulty getting boxes for its shoes during the war and now it is also helping out a nearby brewery with beer boxes, and other customers. It installed a 5-cylinder machine a year ago and a short time before that, it installed a smaller machine. Mitchell Thom, long time paper mill superintendent in British Columbia, has built up board pro-

duction to 16 tons plus 12 tons on wet machines, and he is still making improvements.

Out in Puebla, 75 miles southeast of Mexico City, is Cartones San Rafael, S. A., headed by Jose Luis Ruzerio, a little mill built two years ago. On the road to the resort town of Cuernavaca, southwest of Mexico City, is another mill, which started up eight months ago, with a cylinder machine. There is a scattering of other tiny mills mostly with wet machines. Above are all the mills of much consequence.

There is plenty of talk of more big mills. Chihuahua and Durango states have plenty of pine timber but water is a problem.

With the mining business on the down-grade, the Mexico Northwestern Road in Chihuahua is reported needing a paper mill to keep it operating. Sam Rosoff, the New York subway builder, and some Mexicans, formerly owned the railroad and were interested in newsprint and a location was selected 100 miles west of Chihuahua, at Matachic. But after an American engineer vetoed the idea they sold the railroad to the Mexican government. It seems certain that a mill will some day be built in Chihuahua. Also, with all the sugar produced in Mexico, there is much talk of bagasse pulp. A mill making hard wallboard has already been organized. And so it goes.

There is no doubt that Mexico has awakened as a pulp and paper country.

Increases In Quality Advertising Are Planned

A poll shows 47% of the members of the Association of National Advertisers plan to increase their advertising budgets in 1948 and only 9% plan reductions. With some grades of paper more plentiful, the poll showed that advertisers were almost unanimous in the opinion that quality circulation is still highly preferable to forced circulation increases.

Site of First B. C. Mill

A cairn consisting of seven huge mill stones with bronze plaque in front of the office of the Bloedel, Stewart & Welch, Ltd., pulp mill at Port Alberni, B. C., will commemorate the location of the first pulp mill built in British Columbia. The original mill was built at Port Alberni in 1893 and, though the area was heavily forested, the raw materials used were rags, old paper and bracken. The enterprise was of brief duration.

UNREST IN INDIA has given impetus to the paper rug-backing industry in the U. S. The American rug industry has used that stricken country's jute in some rug-backing operations. But now the rug manufacturers have turned to the U. S. paper industry for their supplies of kraft cord for rug backing. E. R. Chatterton, vice president of E. W. Twitchell, Inc., Philadelphia, manufacturers of kraft cord paper for industrial uses, says the kraft cord is equal or superior to jute.

FACTS ABOUT THE INDUSTRY

General Information

U. S. INDUSTRY STATISTICS (Data for 1946 is latest available)

	1939	1940	1941	1942	1943	1944	1945	1946
Total assets (billions)	\$2.36	\$2.46	\$2.61	\$2.68	\$2.76	\$2.81	\$2.97	\$3.14
Net Worth (billions)	\$1.70	\$1.77	\$1.86	\$1.92	\$1.99	\$2.05	\$2.13	\$2.29
Net Sales (billions)	\$1.45	\$1.75	\$2.36	\$2.46	\$2.59	\$2.77	\$2.88	\$3.24
Taxes (millions)	\$49	\$95	\$241	\$265	\$254	\$261	\$214	\$209
No. of Employes (thousands)	138	146	158	158	150	146	146	167
Wages (millions)	\$176	\$195	\$243	\$274	\$299	\$315	\$323	\$366
Tons Produced Per Employee	98	99	113	108	113	118	119	111
Wages Per Ton Production	\$13.0	\$13.4	\$13.7	\$16.0	\$17.6	\$18.3	\$18.6	\$19.7
Index Unit Production Per Man Hour	100.0	104.2	106.7	101.8	94.7	92.7	95.2	(3)
Value of Production (billions)	\$1.16	\$1.75	\$2.36	\$2.47	\$2.59	\$2.77	\$2.88	\$3.24

Estimates for 1946. Source: American Paper and Pulp Assn. except labor data which is by U. S. Bureau of Labor Statistics.

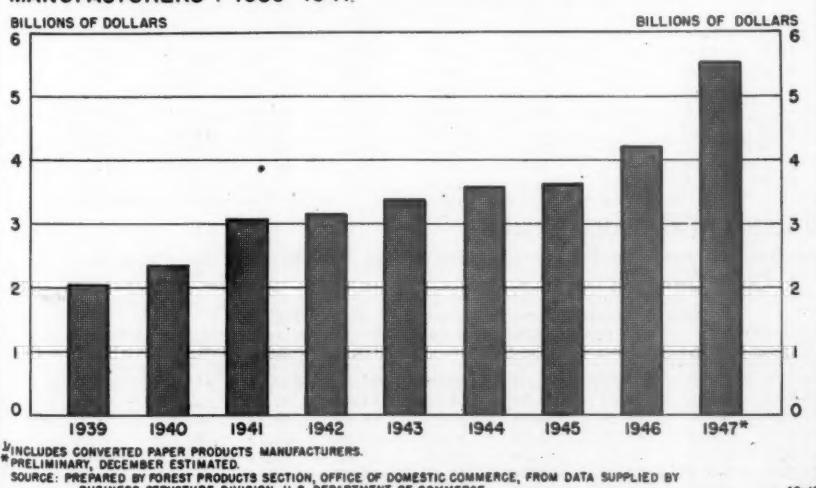
Principal Statistics of Canadian Pulp and Paper Industry

Year	Establishments	Capital	Employees	Salaries and Wages	Fuel and electricity used	Materials and supplies used	Gross Value of products	
							No.	\$
1919	99	275,767,364	26,647	32,264,206	12,503,197	54,084,801	137,912,502	
1920	100	347,553,333	31,298	45,253,893	16,989,356	84,208,788	236,420,176	
1921	100	379,812,751	24,619	34,199,090	14,961,741	62,276,224	151,003,165	
1922	104	381,006,324	25,830	32,918,955	13,000,002	64,692,722	158,950,956	
1923	110	417,611,678	29,234	38,382,845	18,421,804	71,322,722	184,821,511	
1924	115	459,457,690	27,627	37,649,528	17,396,375	72,233,876	179,259,504	
1925	114	460,397,772	28,031	38,560,905	17,506,735	76,514,990	193,062,937	
1926	115	501,184,714	31,279	44,175,502	20,424,405	85,365,465	215,370,274	
1927	114	579,853,552	32,876	45,674,293	24,024,319	84,813,080	219,329,753	
1928	110	685,687,459	33,614	47,322,648	24,546,957	88,490,421	233,077,236	
1929	108	644,773,800	34,202	50,214,445	25,355,090	96,874,749	243,970,761	
1930	109	703,937,104	33,207	45,774,976	26,158,260	81,992,255	215,674,246	
1931	103	630,176,540	26,669	34,702,013	22,927,919	63,947,678	174,733,954	
1932	98	597,550,013	24,561	28,348,128	19,821,839	48,970,967	135,648,729	
1933	95	559,265,544	24,037	26,657,542	18,902,330	47,632,151	123,415,492	
1934	95	554,973,891	26,993	33,307,043	21,977,913	53,426,534	152,647,756	
1935	95	545,572,938	27,830	35,893,313	22,682,883	57,995,077	159,325,546	
1936	93	536,073,034	29,478	39,440,074	25,600,606	72,202,983	183,632,995	
1937	98	570,352,287	33,205	45,757,705	29,121,065	91,121,629	226,244,711	
1938	99	594,908,222	30,943	42,619,311	23,800,737	71,062,580	183,897,503	
1939	100	597,908,918	31,016	44,737,379	25,094,978	70,933,657	206,152,295	
1940	103	642,979,942	34,719	56,073,812	31,045,406	108,758,862	208,684,843	
1941	106	678,937,841	37,154	63,677,818	34,437,122	125,437,012	334,726,175	
1942	105	655,598,196	38,002	69,656,393	36,226,420	135,970,437	336,607,277	
1943	106	667,458,143	37,020	71,199,422	36,211,064	143,956,462	345,653,470	
1944	104	*	37,896	75,833,408	37,358,842	157,995,141	369,846,086	
1945	109	*	39,996	80,462,644	39,033,131	179,380,499	398,804,515	
1946	113	850,000†	44,967	101,364,636	46,202,000	202,495,472	527,814,916	
1947	113	1,000,000†	48,000†	115,000,000	*	*	700,000,000†	

*Not available.

†Estimated.

ANNUAL VALUE OF SHIPMENTS OF U. S. PULP AND PAPER MANUFACTURERS: 1939-1947



Number of U. S. Mills

Our information indicates these totals for the number of companies and mills in the U. S.:

	1945	1946	1947
Companies	522	517	559
Paper Mills	723	735	656
Pulp Mills	249	242	242

Number of U. S. establishments (pulp and/or paper), and other information over a 100-year period follows (1947 data not yet available):

Year	No. of Operations	Wage Earners	Wages Paid	Industry Worth
1849	443	6,785	\$1,497,792	\$7,260,864
1859	555	10,911	2,767,212	14,052,683
1869	677	18,021	7,208,691	34,556,014
1879	742	25,631	8,970,133	48,139,652
1889	649	31,050	13,204,828	89,829,548
1899	763	49,646	20,746,426	167,507,713
1909	777	75,978	40,804,502	409,348,505
1919	729	113,759	135,690,642	905,794,583
1929	883	128,049	173,077,781	1,250,000,000
1933	781	107,298	99,194,024	(not avail.)
1939	832	137,445	175,687,842	1,700,000,000
1940	854	146,500	195,000,000	1,770,000,000
1941	891	157,800	243,000,000	1,860,000,000
1942	897	157,700	274,000,000	1,920,000,000
1943	900	150,000	299,000,000	1,990,000,000
1944	890	146,400	315,000,000	2,050,000,000
1945	874	145,500	323,000,000	2,130,000,000
1946	837	167,000	366,000,000	2,290,000,000

Source: American Paper and Pulp Association; U. S. Labor Statistics; Census.

What It Costs

To Make Newsprint Today

It costs about \$60,000 to \$75,000 per ton to build a newsprint mill today, varying according to local conditions, according to experienced engineers. This includes all wood and pulp processing equipment and finishing equipment and structures but, of course, does not include cost of wood, operating capital, water and other such items.

British Columbia Payroll

Total payroll of the pulp and paper mills in British Columbia in 1946 was \$11,158,690, according to official returns of the provincial department of labor. In 1943 the total was \$8,727,109; in 1944, \$9,449,766 and in 1945, \$9,880,380.

PAYROLL STATISTICS

Employes Earn Above Average

ONE of the most significant developments in the past year as far as labor is concerned in the pulp and paper manufacturing industry of the United States is the evidence that its average hourly earnings are now ahead of the average for all industries of the nation.

Unheralded, of course, because it was unknown until the data were all collected some months later, the record shows that the pulp and paper average went ahead of the national average during 1947.

Up to that time, the average hourly pay of the pulp and paper industry was slightly behind that of all industries. In the war years, it could hardly be expected to keep pace with the "cost-plus" and other favored wartime industries.

In 1946, the average hourly pay of pulp and paper workers passed the dollar mark to \$1.04, and by December it was \$1.12,

WHAT EACH REGION COMPRISES

In the tables used in this section comparing wage data in different regions of the U. S., information was obtained from nearly all states making pulp and paper. Here are states included in each of the regions mentioned in these tables:

NEW ENGLAND—Conn., Maine, Mass., N. H. and Vt.

MIDDLE ATLANTIC—New Jersey, N. Y. and Penn.

LAKE STATES—Mich., Minn. and Wisconsin.

CENTRAL STATES or CENTRAL NORTH—Ill., Ind. and Ohio.

CENTRAL ZONE or CENTRAL SOUTH—Del., Tenn. and West Va.

SOUTHERN ZONE or SOUTH—Alabama, Ark., Fla., Louisiana and Miss.

PACIFIC COAST—Calif., Wash. and Ore.

but still about three cents behind the national average.

Then in June 1947, it spurred to \$1.231, a half cent ahead of the national average and by last December it was \$1.297, as compared with \$1.279—nearly two cents ahead.

The average hourly pay in this industry is now twice what it was in early 1940 as shown in the following table:

TREND IN AVERAGE HOURLY EARNINGS U. S. PULP AND PAPER INDUSTRY

U. S. FACTORY AVERAGE

(Source: U. S. Bureau of Labor Statistics)

	Pulp & Paper	U. S. Factory
	Hourly Earnings	Hourly Earnings
June 1939	\$.618	\$.631
Dec. 1939	.631	.652
June 1940	.644	.662
Dec. 1940	.660	.676
June 1941	.716	.732
Dec. 1941	.738	.783
June 1942	.797	.845
Dec. 1942	.829	.907
June 1943	.851	.959
Dec. 1943	.863	.995
June 1944	.884	1.017
Dec. 1944	.904	1.040
June 1945	.906	1.058
Dec. 1945	.945	.994
June 1946	1.038	1.084
Dec. 1946	1.119	1.148
June 1947	1.231	1.226
Dec. 1947	1.297	1.279

Trends in Pay Increases

The number of production workers in the paper and allied products industries in the U. S. totaled 387,000 in Jan. 1948, a decrease of 3,000 from December, according to the department of Labor. Com-

pared with a year earlier—Jan. 1947—the Jan. 1948 employment was slightly higher. The same trend was registered by the nondurable goods and all manufacturing industries.

Weekly hours worked by employes in the paper and allied products industries in the U. S. rose from 43.2 in Nov. 1947 to 43.8 in December and new peaks were reached in weekly earnings. For all paper and allied industries, the average weekly earnings were \$53.77 in December, 1947. For pulp and paper manufacturing alone it was \$58.17; for envelopes, \$47.15; for the paper bag industry, \$45.35, and for the paper box industry, \$49.44.

Another significant trend which PULP & PAPER editors in both the U. S. and Canada report to be rather general over the continent is that the pay increases in 1948 are tapering off from the pace they were setting in recent years. Instead of 10 or 15-cent hourly increases, where there have been pay boosts reported these are limited usually to about five cents.

Pay Raise on Coast

The tables published here, of course, do not take into account the pay increases negotiated during 1948.

The Pacific Coast wage conference for 32 Coast mills with 15,000 employees agreed on a 9% increase (at least 15 cents an hour for men employes) on April 18 in Portland, Ore. Men's base rate was boosted to \$1.42½ an hour, women's to \$1.16½.

Unofficially, the new averages which would correspond to figures in these tables are:

Average hourly earnings (inc. over-

UNITED STATES PAYROLLS

Average Hourly Earnings in Cents of Productive Employees (Exclusive of Converting Employees) in Pulp and Paper Manufacturing.

(Source: Calculated from tables received from A.P.P.A.)

June to December Inclusive

	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947
Pacific Coast	79.6	79.8	83.8	97.7	106.9	114.7	118.6	117.2	139.3	160.9
Other Regions	61.3	61.6	65.0	72.6	81.2	86.5	88.9	90.0	108.5	127.0
New England	60.8	61.2	64.0	71.5	79.3	84.0	86.5	90.8	107.2	124.9
Middle Atlantic	63.9	64.3	67.6	76.2	85.2	89.4	91.9	96.6	110.3	128.0
Lake States	65.0	65.6	68.0	74.7	82.1	86.0	89.1	93.5	110.5	130.0
Central (North)	62.6	62.4	64.4	71.9	78.7	83.1	86.0	92.7	109.2	127.3
Central (South)	54.9	55.1	59.5	66.5	76.2	79.5	83.2	87.4	99.4	114.5
Southern	57.3	55.9	61.7	74.0	84.2	86.0	92.7	97.3	113.3	132.0

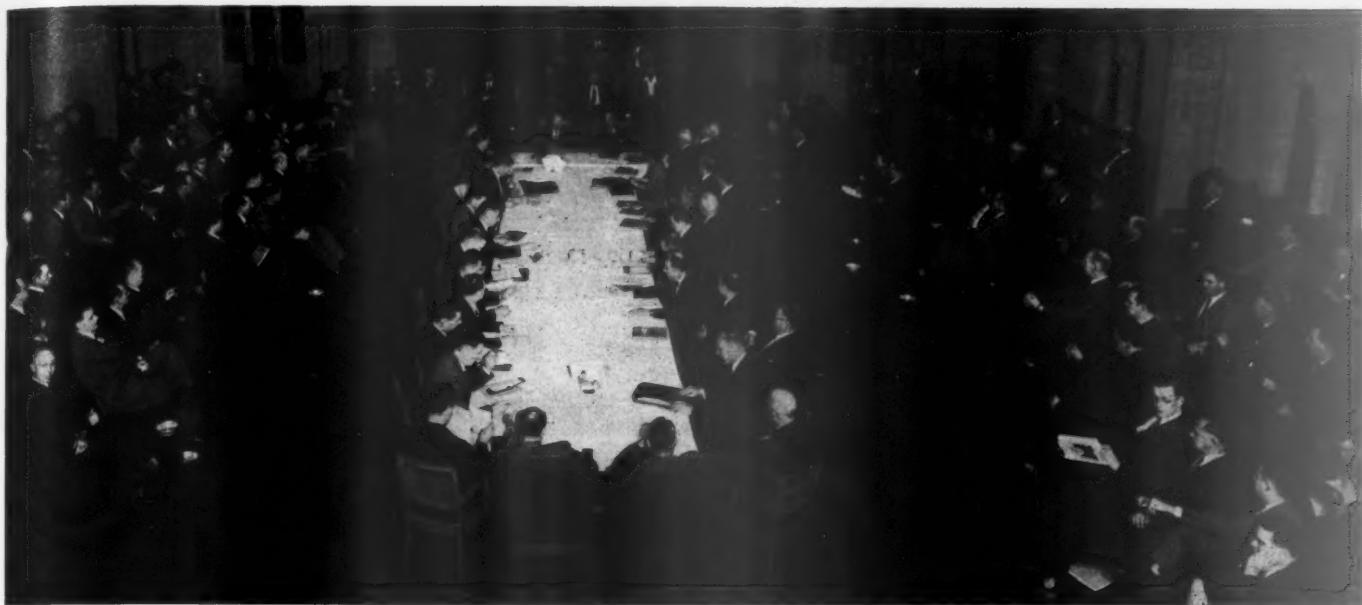
UNITED STATES PAYROLLS

Average Weekly Earnings of Productive Employees (Exclusive of Converting Employees) in Pulp and Paper Manufacturing.

(Source: Calculated from tables received from A.P.P.A.)

June to December Inclusive

	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947
New England	\$22.39	\$24.27	\$24.35	\$29.78	\$32.63	\$38.59	\$41.21	\$42.94	\$46.15	\$52.76
Middle Atlantic	24.04	26.74	26.29	31.97	35.84	41.11	43.44	45.64	47.26	55.06
Lake States	25.17	26.62	27.52	31.18	34.15	39.15	41.48	43.34	44.97	53.81
Central (North)	23.41	25.23	26.03	31.04	31.73	37.19	40.05	41.93	46.73	54.96
Central (South)	20.79	21.85	23.25	27.22	30.34	34.32	37.42	36.74	39.48	45.45
Southern	21.39	21.82	24.52	28.88	34.71	38.43	43.68	43.13	45.69	54.00
Pacific Coast	26.49	30.12	32.33	36.54	43.71	50.40	51.66	49.63	52.62	61.71



HERE IS VIEW OF PACIFIC COAST pulp and paper industry 1948 management-labor wage conference which closed April 18 in Portland, Ore. (with 9% wage increase (15-cent minimum for men) for 15,000 employees in 32 Pacific Coast mills. This was 14th annual industry-wide conference on Pacific Coast and boosted men's base pay to \$1.42½ an hour, world's record for this industry. Women's base pay was boosted to \$1.16½.

At far end of table are co-chairman of conference, John Sherman (on left) for AFL unions and J. D. Zellerbach (on right) for Pac. Coast Pulp & Paper Mfrs. Assn. On management side of table (right side) beginning at far end are Alexander

Heron, Crown Zellerbach, exec. vice pres. of Mfrs. Assn.; Jack Hanny, Crown Z.; a woman reporter; Lawson Turcotte, Puget Sound Pulp, also new president of Mfrs. Assn.; Howard Morgan, Weyerhaeuser; J. W. Genuit, Fornstrom; Leo Burdick, Soundview; F. J. Herb, Pac. Coast Mills; Irving Rau, St. Helens; Robt. S. Wertheimer, Longview Fibre and Secy.-Treas. of Mfrs. Assn.; Wm. Breitenbach, Rayonier; H. L. Wollenberg, Longview Fibre; R. E. Bundy, Fibreboard Products; Lyall Tracy, Rayonier, and Anson Moody, Everett P. & P. In extreme lower right corner, resting head on hand, is Russell LeRoux with Weyerhaeuser executives. Other management groups on right; labor groups on left.

time and premium pay).....\$1.78
Average hourly rate (straight time).....\$1.62

At the end of April, 1948, the annual labor-management meeting in Mobile, Ala., was to begin discussions of a union request for a 20% increase in the eight International Paper Co. mills in the South. The AFL association of 53 local unions representing 32,000 employees throughout the South went on record in favor of this increase, and 3 weeks' paid vacation for 10-year employees.

The Pacific Coast Association of Pulp & Paper Manufacturers and the AFL unions on the coast were required to begin their negotiations almost two months earlier than usual under the Taft-Hartley law and these were under way in April. Industry wide bargaining which has a 13-year record of unbroken peace on the Pacific Coast, except for one jurisdictional strike in a single mill of more than 30

member mills, was threatened last year under the early terms proposed for the Taft-Hartley bill. But it survived.

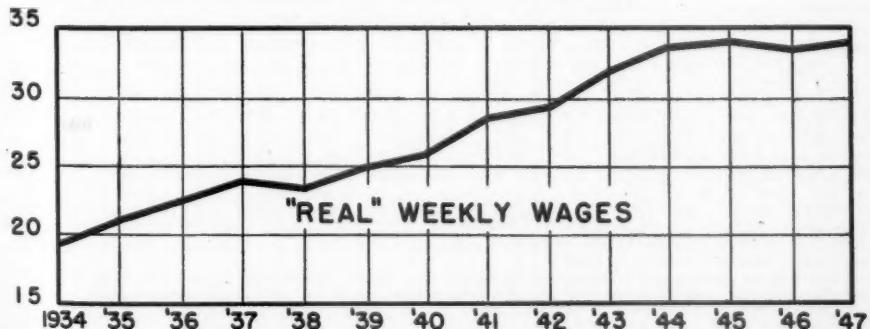
The eight Southern Kraft mills in the South and 18 Canadian mills in the east and the smaller western group of Canadian mills are among other groups which are now carrying on industry-wide bargaining in their areas.

Through 1947, the scale of pay on the Pacific Coast continued as the highest in any region of the United States as far as the pulp and paper industry is concerned.

Because the Pacific Coast figures are the highest, we have made some comparisons between them and the average for all other regions in certain of the tables published in this section.

In 1947, Pacific Coast hourly pay averaged \$1.61 and weekly pay, \$61.71. But average hours, 38.4 per week, were less than in any other region.

THIS "REAL" WEEKLY WAGES CHART has been carefully prepared by APPA to show how much the actual standard of living of pulp and paper mill workers in the United States is—in other words, how much wage rates have increased over and above the actual cost of living.



U. S. LABOR TRENDS

	Employees (thousands)	Weekly earnings
Paper and allied products:		
Dec. 1947	387	\$53.77
Sept. 1946	368.0	\$44.47
Sept. 1945	312.0	\$40.96
Paper and pulp:		
Dec. 1947	—	\$58.17
Sept. 1946	167.7	\$47.57
Sept. 1945	142.0	\$44.46
Envelopes:		
Dec. 1947	—	\$47.15
Sept. 1946	10.4	\$41.93
Sept. 1945	9.5	\$38.12
Paper bags:		
Dec. 1947	—	\$45.35
Sept. 1946	14.7	\$37.89
Sept. 1945	12.2	\$36.28
Paper Boxes:		
Dec. 1947	—	\$49.44
Sept. 1946	87.4	\$41.13
Sept. 1945	76.8	\$36.86

Source: Bureau of Labor Statistics.

It may be a surprise to many in this industry to know that the second highest average hourly rate is in the Southeastern section of the United States, where in the past—as recently as the 1930's—its hourly rate was one of the lowest. It has now risen to \$1.32 an hour.

In third place are the Lake States mills with \$1.30. The Middle Atlantic states are next with \$1.28. And the most hours per week—43 or more—were being averaged in Middle Atlantic and Central States.

All other regions except the Pacific

Coast have an average hourly earning of \$1.27 or nearly 34 cents below the hourly earning on the Pacific Coast.

As for weekly earnings, the Pacific Coast was likewise substantially ahead of all other regions with \$61.71 in the average pay envelope. This compares with \$53.22 as the average for all other regions.

The following table shows relationships of weekly hours, hourly earnings and weekly earnings (elsewhere in this section are statistics for hourly and weekly earnings over a period of ten years):

AVERAGE EARNINGS AND HOURS OF WORK OF U. S. PULP AND PAPER MILL EMPLOYEES

(Exclusive of Converting Employees. Source: Calculated from Tables Received from A.P.P.A.)

JUNE TO DEC. 1947, Inclusive			
	Aver. Weekly Hours	Aver. Hourly Earnings	Aver. Weekly Earnings
Pacific Coast	38.4	\$1.609	\$61.71
Other Regions (Excl. Pacific Coast)	41.9	1.270	53.22
New England	42.2	1.249	52.76
Middle Atlantic	43.0	1.280	55.06
Lake States	41.4	1.300	53.81
Central States	43.2	1.273	54.96
Central Zone (South)	39.7	1.145	45.45
Southern Zone (Southeast)	40.9	1.320	54.00

STATE OF OREGON PAYROLLS AND HOURS WORKED

ALL HAZARDOUS INDUSTRY OF STATE PULP AND PAPER MANUFACTURING

Year.	Payroll	Workmen Hours	Increase or Decrease Compared With Preceding Year			Workmen Hours	Payroll	Increase or Decrease Compared With Preceding Year		
			Payroll	Hours	Work			Payroll	Hours	Work
1927	\$255,669,929	396,071,584				\$4,855,526	7,710,848			
1928	271,223,403	414,002,480	6.08%	4.53%	5,573,223	8,507,600	14.78%	10.33%		
1929	288,903,912	437,600,400	6.52%	5.70%	7,845,335	12,275,072	40.77%	44.28%		
1930	260,002,808	397,369,096	-10.00%	-9.19%	9,110,285	13,874,832	16.12%	13.03%		
1931	188,705,890	317,120,680	-27.42%	-20.19%	6,990,889	11,360,944	-23.26%	-18.12%		
1932	131,893,000	255,078,920	-30.11%	-19.56%	5,063,638	8,960,224	-27.57%	-21.13%		
1933	129,023,888	260,928,662	-2.18%	2.29%	5,166,375	9,693,579	2.03%	8.18%		
1934	161,702,804	284,179,483	25.33%	8.91%	7,435,151	11,835,457	43.91%	22.10%		
1935	187,578,233	312,935,429	16.00%	10.12%	8,131,888	12,560,285	9.37%	6.12%		
1936	241,960,112	379,926,777	28.99%	21.41%	9,858,151	14,638,927	21.23%	16.55%		
1937	286,480,085	412,743,811	18.40%	8.64%	12,607,622	16,305,933	27.89%	11.37%		
1938	267,784,196	379,432,496	-6.53%	-8.07%	10,227,766	12,254,194	-18.88%	-24.85%		
1939	303,602,602	413,236,113	+13.38%	+8.91%	11,919,822	14,197,262	+16.54%	+15.86%		
1940	345,887,756	458,512,732	+13.93%	+10.96%	14,517,595	16,905,387	+21.79%	+19.07%		
1941	475,291,383	561,751,286	+37.41%	+22.52%	17,236,948	18,234,058	+18.73%	+7.86%		
1942	815,109,078	776,362,062	+71.50%	+38.20%	20,724,118	19,642,765	20.23%	7.73%		
1943	1,120,516,847	937,602,553	+37.47%	+20.77%	19,879,950	16,787,877	-4.07%	-14.53%		
1944	1,270,266,925	1,003,431,671	+13.36%	+7.02%	21,865,943	17,411,977	+9.99%	+3.72%		
1945	979,223,289	787,182,567	-22.91%	-21.55%	21,995,846	17,491,211	+.59%	+46%		
1946	878,912,863	679,348,979	-10.02%	-13.69%	25,083,023	17,612,908	+14%	+0.1%		
1947	1,040,749,129	723,285,722	+18.41%	+6.47%	\$32,611,322	19,551,473	+30.01%	+11.01%		

Source: Department of Labor and Industries, State of Washington.

CALIFORNIA EMPLOYMENT AND PAYROLL DATA

(Based on all contribution reports submitted to department—Latest year available is 1946)

Industry	1943			1944			1945			1946			
	Total Wages Paid	No. of Plants (a)	No. of Workers Jan. Dec.	Total Wages Paid	No. of Plants (a)	No. of Wkrs. Dec.	Total Wages Paid	No. of Plants (a)	No. of Wkrs. Dec.	Total Wages Paid	No. of Plants (a)	No. of Wkrs. Dec.	
Total	\$19,194,995	136	8,294	8,245	\$20,683,393	145	8,712	\$22,787,169	156	8,744	\$19,534,725	187	7,416
Coated and Glazed Paper	1,488,545	8	802	634	1,541,469	8	664	1,697,649	8	634	1,616,306	11	579
Paper Envelopes	1,809,274	14	832	780	1,802,058	14	682	1,969,892	15	634	2,218,230	15	772
Paper Bags	1,386,903	13	761	740	1,832,669	16	892	2,218,506	17	887	2,912,726	18	1,163
Paperboard Containers and Boxes (c)	11,050,975	58	4,419	4,545	6,549,062	53	2,716	7,428,882	57	2,818	9,077,360	72	3,451
Pulp Goods and Paper Products, not Elsewhere classified (b) (c)	3,459,298	43	1,480	1,546	8,958,135	54	3,758	9,472,240	59	3,771	3,710,103	71	1,452

(a) Each branch of a multiple establishment—concern is counted as a separate establishment.

(b) Includes branches of such firms as pulp mills, paper mills and paperboard mills.

(c) Note considerable change between years 1943 and 1944 in classifications "Paperboard Containers and Boxes" and "Pulp Goods and Paper Products, not elsewhere classified." This is due to changing industrial classification of firms manufacturing paperboard as well as making containers and boxes from "Paperboard Containers and Boxes" group (firms fabricating containers from purchased stock) to "not elsewhere classified" group.

Source: California Department of Employment affiliated with Social Security Board Report 127A, No. 47 for 1943, No. 52 for 1944.



WALL ST. VIEWS Regarding Future of Pulp and Paper And Opinions Of Industry Leaders Are Different.

AS was apparent last year, there remains a slight discrepancy between the opinions of the experts of Wall Street and the opinions of industry leaders as to the future of pulp and paper. The discrepancy is a natural one, but in this year's reports from financial circles there is a faint touch of asperity—as if the industry had let the experts down by not getting into trouble in 1947 or early in 1948.

"For some time," one report states, "we have believed that a reversal in this trend (a record high relationship to the stock market in general) would appear and that it could be fairly close at hand. Nothing has occurred fundamentally to alter this view."

Yet even the most cautious reports admit that, although paper and paperboard shares were off sharply as a class in the spring of 1947, their subsequent recovery was strong. They also indicate some optimistic prospects for this year, stating that these classifications should "fare well over the next year or so"—pulps, tissues, kraft papers and kraft board. They also indicate that book, newsprint and fine papers, "largely because of record general business activity and national income," have forged ahead importantly—but they add that this could mean a slower rate of growth to follow.

What worries the Wall Street wizards, as usual, is over-capacity. They call it the industry's "proclivity for increasing capacity more than is warranted in anticipation of the normal, near term growth in demand." (This, of course, is, the habitual reference to the newsprint "crash" of the 20's and overlooks the fact that the kraft industry—now the largest industry segment—has never reached demand and that very little newsprint is now made in the U. S.)

They also point out that the profit trend in the industry has not paralleled the long-term rise in production. One observer says, "It seems to us that the industry may lose, for a time, some of the lush profits of the last two years."

This attitude further includes the belief that material shortages, and strikes, affecting delivery of equipment, retarded the closing of the gap between supply and demand and thus maintained the strong position that the industry maintained during the war! But now the financial observers show alarm at the fact that in 1948 the addition to capacity may break all records, even though it may not see completion of the postwar program. They point out that the prospect of more than 23 million tons for 1948 would mean an aggregate of 19 million tons if the industry operated at the 80% average prevalent in the late prewar period. They do not believe that such volume could be sustained in the recession which, as we go to press, is still being heralded for 1948 by some Wall Street surveys. But, even so, these observers admit that production, even under such conditions, should hold above that for any year prior to 1946.

Those who believe that the supply-demand equilibrium can be expected in the months just coming up take note, as usual, of the correlation between non-durable goods and paper and paperboard consumption. They

COMPARATIVE OPERATING RESULTS AND PER SHARE STATISTICS

(Sales, Profits and Income in Thousands of Dollars)

	Net Sales	*Pre-Tax Profits	*Net Income	† Per Common Share #Earned Dividends	Price Range
b-American Writing Paper Co. (Dec. 31):					
1939	\$ 6,784	\$ 286	\$ 239	\$ 0.67	Nil 2 1/2-1 1/4
1941	8,713	195	137	0.32	Nil 3 1/2-2 1/4
1943	9,355	821	245	0.65	Nil 5 1/2-2 1/2
1944	9,122	568	184	0.51	Nil 7 1/2-4 1/2
1945	9,211	308	151	0.42	Nil 11 3/4-5 1/2
1946	11,397	586	306	0.85	Nil 12 1/2-7 1/2
1947	13,326	992	574	1.61	0.25 10 1/2-7 1/2
b-Brown Co. (Nov. 30):					
1941	32,198	5,177	3,727	c 25.79	Nil c 31 1/2-25
1943	30,998	2,501	1,126	c 7.80	Nil c 36 -28 1/4
1944	32,329	2,513	1,298	c 8.99	Nil c 44 1/2-28 1/2
1945	33,284	2,143	1,220	c 8.44	Nil c 83 -45
1946	36,087	2,557	1,594	c 11.03	Nil c 92 -68
1947	42,630	4,813	2,838	c 19.64	Nil c 98 1/2-68
Champion Paper & Fibre Co. (a-April 30):					
1937	22,415	1,851	1,557	0.99	1.12 1/2 31 1/2-12 1/2
1939	23,406	1,638	1,330	1.12	0.05 15 -8 1/2
1941	42,258	7,833	3,130	2.36	0.50 11 1/2-7 1/2
1943	46,249	7,099	1,971	1.29	0.50 12 -9
1944	48,485	6,874	1,804	1.02	0.50 15 1/2-11 1/2
1945	49,218	4,534	2,057	1.24	0.62 1/2 27 1/2-14 1/2
1946	67,611	9,903	3,376	4.47	1.00 34 1/2-21 1/2
1947	N.A.	N.A.	4,601	c 3.86	1.25 27 -19 1/2
Consolidated Paper Co. (Dec. 31):					
1937	12,815	1,614	1,302	1.74	2.00 22 -14
1939	9,786	1,136	933	1.24	1.00 17 -13
1941	15,367	2,905	1,449	1.93	1.25 16 1/2-15
1943	17,976	3,106	1,222	1.63	1.00 15 1/2-12
1944	18,323	2,796	1,072	1.43	1.50 17 1/2-14 1/2
1945	17,773	1,640	921	1.23	1.00 23 -18
1946	23,296	2,613	1,552	2.07	1.25 21 1/2-14 1/2
1947	31,429	5,551	3,416	4.55	2.00 18 1/2-14 1/2
Container Corp. of America (Dec. 31):					
1937	25,268	2,312	1,784	2.28	1.20 37 1/2-10 1/2
1939	24,115	1,742	1,449	1.85	0.25 17 1/2-9 1/2
1941	46,714	6,742	2,327	2.98	1.50 16 1/2-11
1943	61,164	10,384	2,684	3.70	1.50 23 1/2-16
1944	69,641	10,513	2,663	3.41	1.50 29 1/2-20
1945	74,138	9,016	2,326	2.97	1.50 40 1/2-26 1/2
1946	91,090	13,136	7,765	7.84	3.40 54 1/2-35 1/2
1947	128,346	16,974	10,274	10.09	4.50 48 -32 1/2
Crown Zellerbach Corp. (a-April 30):					
1937	49,891	7,488	6,211	1.58	0.25 25 1/4-8 1/2
1939	56,527	10,324	8,119	2.42	0.50 17 1/2-9
1941	86,336	20,103	11,109	3.74	1.00 15 1/2-10
1943	97,834	15,432	7,603	2.19	1.00 17 -11 1/2
1944	98,814	13,700	7,093	1.97	1.00 22 1/2-15 1/2
1945	102,075	13,517	7,825	2.37	1.00 30 1/2-20
1946	127,796	25,059	15,053	5.22	1.10 40 1/2-25
m 1947	114,225	23,046	14,171	4.97	1.70 34 7/8-25
Eddy Paper Corp. (Dec. 31):					
1937	9,694	785	650	3.65	3.00 41 1/4-18 1/2
1939	8,578	394	328	1.77	0.50 19 1/4-14 1/2
1941	14,972	2,233	833	4.50	2.00 21 -13 1/2
1943	14,369	3,008	768	4.68	3.50 28 1/2-22
1944	16,020	3,924	1,059	6.44	4.50 38 -25
1945	16,534	3,493	848	5.16	4.50 52 -39
1946	19,582	4,765	2,925	17.78	13.00 111 -48 1/2
1947	28,468	9,333	5,768	35.06	15.00 113 -81
Gair (Robert) Co., Inc. (Dec. 31):					
1937	21,655	794	557	**	Nil **
1939	14,735	d624	d634	**	Nil **
1941	23,393	2,465	1,127	0.80	0.25 2 3/4-1 1/4
1943	26,576	3,146	969	0.66	0.30 4 1/2-1 1/2

expect the cessation of the almost uninterrupted price advance, and feel the industry is vulnerable because of a more pronounced rise than for the majority of commodities since just before the world war. But some—not all—of the Wall Street reports fail to take into consideration the supporting influence of tight wood supply on paper and paperboard manufacture. Also supporting was the import situation, both abroad and Canada. None of the reports, however, took into consideration the cost of wood along with the tightness of supply. Increased wood cost is something more than a natural corollary of pinched supply. Labor and transportation, and the distance of wood from mill, have entered into the woodlands picture significantly enough to support the industry's price picture in comparison with other industries. What is more, as Reuben Robertson, president of Champion Paper and Fibre Company, pointed out during the 1948 Paper Week, no other industry has an investment of \$1800 per worker. You do not build, or improve, a paper mill these days for peanuts.

The same experts state that labor rates, fuel supplies and transportation are not likely to decline this year. Wood and pulp prices are in a strong position, admittedly stronger than the prices of finished products. There are already some pressures on the profit margins, particularly in end-products. It is for this reason that some of the so-called "expansion"—which is in many instances improvement—is bent toward getting more yield from a given unit of wood. That is another point which the bearish avoid in their survey of the industry. Many of the millions being spent for what is generally known as "added capacity" are more accurately, for added yield. There is an important difference which has a definite bearing on the stability of the industry in the future economic frame. But there is no question but that those companies who started early on their expansion programs are in favored spots. One estimate has it that property investment per unit of output has advanced up to 80 percent since the war.

Whatever the future, there is no question about 1947 being a record year. Although production went up about 10% to reach a new peak, shortages were still in evidence. Prices were advanced and costs were at least kept from flying completely into the wild blue yonder. The state of the industry was reflected in the physical appearance of some of the annual reports of companies, as well as by their contents. Probably never in industry history has so much thought been put on the dramatic and clear presentation of annual report data as is evidenced in many reports this year.

And, as will be seen from a briefing of some of the reports below, never before had so many companies had so much reason for a dramatic presentation. The physical appearance of the reports was not merely an effort at show, but rather a continuation of the trend to make the purpose of the industry clearer to the stockholders, and to make its problems clearer. And in many instances there was more to tell than mere figures would show—acquisition of timber, expansion of plant, progress into end-use fields, all require more than cold statistics.

Annual Reports

In the annual report of the Minnesota and Ontario Paper Co., Donald D. Davis, president, advised shareholders that the net income for the year 1947, after taxes and after appropriations of \$400,000 to the reserve for contingencies, was \$5,753,359 (\$4.46 per share on 1,289,994 shares of the Company's stock outstanding at December 31, 1947).

The report discloses that net sales for the year 1947 were \$48,996,712. Total current assets as of December 31, 1947 were \$21,349,465 and total current liabilities were \$9,686,813.

Mr. Davis further stated that increased earnings for the year reflect the benefits of continuous operations

COMPARATIVE OPERATING RESULTS AND PER SHARE STATISTICS (Continued)

(Sales, Profits and Income in Thousands of Dollars)

	Net Sales	*Pre-Tax Profits	*Net Income	†Earnings	Per Common Share
					oPrice oDividends Range
1944	27,640	2,766	761	0.48	0.30 5 1/4- 2 1/2
1945	28,093	2,209	715	0.33	0.30 10 1/4- 4 1/2
1946	33,697	3,749	2,296	1.12	g 11 1/8- 7
1947	44,837	8,639	5,381	2.83	0.35 10 1/4- 5 1/2
Gaylord Container Corp. (Dec. 31):					
1937	13,480	2,307	1,765	0.92	0.25 N.A.
1939	13,660	809	662	0.24	0.23 1/4 6 1/4- 3 1/2
1941	25,281	3,970	1,749	0.91	0.33 1/4 4 1/4- 2 1/2
1943	31,708	3,153	1,243	0.61	0.33 1/4 4 1/4- 3 1/4
1944	33,945	3,851	1,287	0.63	0.33 1/4 7 1/4- 4 1/2
1945	35,615	2,855	1,105	0.51	0.33 1/4 13 1/4- 7 1/2
1946	44,284	8,281	5,046	2.43	0.83 1/4 25 - 11 1/2
1947	57,271	15,659	9,529	4.06	1.66 1/4 23 3/4- 14 1/4
Great Northern Paper Co. (Dec. 31):					
1937	N.A.	2,577	2,178	2.18	2.00 47 -27
1939	N.A.	3,296	2,727	2.73	2.40 45 -33
1941	N.A.	3,815	2,432	2.44	2.50 42 -29 1/2
1943	N.A.	3,097	1,860	1.86	1.60 36 -27 1/4
1944	N.A.	2,775	1,667	1.67	1.60 37 1/2- 29 1/4
1945	N.A.	1,529	903	0.90	1.60 47 1/2- 35 1/4
1946	N.A.	3,949	2,364	2.37	1.60 46 1/2- 39 1/2
1947	N.A.	6,885	4,103	4.11	2.40 47 1/4- 39 1/2
Hammermill Paper Co. (Dec. 31):					
1937	7,443	580	450	1.25	3.00 N.A.
1939	7,330	623	463	1.83	0.50 28 1/2- 18
1941	10,703	1,351	671	3.11	1.25 25 1/4- 15 1/2
1943	11,424	1,663	585	2.64	1.00 23 - 17 1/2
1944	12,570	1,591	454	1.92	1.00 29 - 19 1/2
1945	11,856	1,087	528	2.35	1.00 42 1/2- 27
1946	14,107	1,615	940	4.32	1.00 52 1/4- 28
1947	17,645	2,518	1,468	7.27	1.00 40 1/2- 28
Hinde & Dauch Paper Co. (Dec. 31):					
1937	15,827	1,778	1,428	3.61	2.00 37 - 16 1/4
1939	13,845	1,091	912	2.04	1.00 19 - 14 1/4
1941	22,490	3,346	1,446	3.42	1.50 16 1/2- 12 1/2
1943	24,848	3,574	1,197	2.83	1.50 21 1/4- 14 1/4
1944	24,357	3,368	1,148	2.69	1.50 25 1/2- 19 1/4
1945	24,054	2,749	999	2.01	1.00 33 1/4- 25
1946	22,946	2,850	1,750	3.67	2.00 43 - 26
1947	35,034	5,509	2,409	5.06	3.50 33 - 26
International Paper Co. (Dec. 31):					
1937	123,487	11,780	9,135	2.47	Nil 19 1/4- 6 1/4
1939	122,290	5,709	4,894	0.14	Nil 14 1/4- 6 1/4
1941	214,334	43,751	16,254	6.37	Nil 20 - 10 1/2
1943	216,123	32,451	10,120	3.01	Nil 14 1/4- 8 1/4
1944	231,572	35,833	10,560	3.26	Nil 21 1/4- 13 1/4
1945	234,246	28,923	10,977	3.40	Nil 48 1/4- 19 1/4
1946	287,868	56,396	31,179	7.99	3.00 55 1/2- 38 1/2
1947	405,248	100,075	54,397	15.02	4.00 59 1/2- 38 1/4
Kimberly-Clark Corp. (Dec. 31):					
1937	27,250	3,124	2,360	1.81	1.00 23 1/4- 8 1/2
1939	27,861	3,561	2,651	2.11	0.87 1/2 19 - 10
1941	36,959	5,818	3,104	2.57	1.12 1/2 19 - 12 1/2
1943	57,488	6,694	2,550	2.00	0.87 1/2 17 - 12 1/2
1944	61,331	6,125	2,422	1.55	1.00 21 - 15 1/4
1945	56,882	4,557	2,447	1.66	1.00 13 1/2- 19 1/4
1946	66,377	6,830	4,265	3.15	1.00 35 - 21 1/4
1947	91,010	11,496	7,172	4.29	1.30 27 1/4- 21 1/4
Marathon Corp. (Oct. 31):					
1937	N.A.	1,087	857	p1.02	e0.75 22 - 8 1/2
1939	13,298	724	592	p0.93	0.25 11 1/2- 8 1/2
1941	18,081	2,012	1,205	p1.59	0.37 1/2 8 1/2 - 6
1943	25,381	5,008	1,286	p1.49	0.50 10 1/2- 8 1/2
1944	29,856	5,979	1,603	1.88	0.50 16 - 13 1/2
1945	31,941	5,602	1,360	1.39	0.50 29 1/2- 16
1946	33,244	5,019	2,734	1.91	0.77 1/2 36 1/2- 22 1/2
1947	44,604	8,030	4,654	3.39	1.00 27 1/2- 19 1/2
Mead Corporation (Dec. 31):					
1937	25,373	2,278	1,841	2.40	1.50 34 1/4- 10
1939	21,987	915	744	0.46	Nil 14 1/4- 6
1941	32,452	3,761	2,110	2.66	0.75 9 1/2 - 5
1943	36,878	3,031	1,078	0.89	0.60 10 1/2- 6
1944	39,920	3,292	1,138	0.98	0.60 13 - 8
1945	40,857	2,636	1,191	1.06	0.70 25 - 12 1/2
1946	53,429	5,607	3,449	4.22	1.15 30 1/2- 18 1/2
1947	72,273	9,356	5,658	7.33	1.55 23 1/2- 16 1/2
National Container Corp. (Dec. 31):					
1937	3,065	357	312	0.16	0.08 1/4 4 1/4 - 2 1/2
1939	4,864	434	358	0.18	0.06 1/2 3 1/2 - 1 1/2
1941	9,207	2,729	1,073	0.54	0.20 4 1/4 - 2 1/2
1943	12,969	3,191	817	0.41	0.16 4 1/2 - 3 1/2
1944	17,656	4,474	1,191	0.60	0.30 4 1/2 - 3 1/2
1945	18,767	4,112	1,186	0.56	0.28 10 1/2 - 4 1/2
1946	28,776	9,063	5,606	2.27	\$0.41 12 1/4 - 8 1/2
1947	43,347	17,468	10,913	4.13	1.10 15 1/2- 10 1/2
Oxford Paper Co. (Dec. 31):					
1937	N.A.	934	800	0.75	Nil 20 - 7 1/2
1939	N.A.	825	674	0.42	Nil 8 1/2 - 2

COMPARATIVE OPERATING RESULTS AND PER SHARE STATISTICS (Continued)

(Sales, Profits and Income in Thousands of Dollars)

	Net Sales	*Pre-Tax Profits	Net Income	↑ Per Common Share		
				#Earned Dividends	oPrice	Range
1941	N.A.	1,996	1,057	1.44	Nil	6 1/2 - 3 1/2
1943	N.A.	2,169	914	1.07	Nil	3 1/2 - 1 1/2
1944	N.A.	2,216	1,024	1.36	Nil	8 1/4 - 3 3/4
1945	N.A.	2,104	974	1.23	Nil	15 - 8 1/2
1946	N.A.	3,043	1,843	3.51	Nil	18 - 9
1947	N.A.	4,958	2,991	6.52	0.30	16 1/2 - 11 1/2
Minnesota & Ontario Paper Co. (Dec. 31):						
1941	22,029	3,422	2,628	1.96	Nil	4 1/4 - 2 1/2
1943	23,677	2,464	1,464	1.09	Nil	9 1/2 - 3 1/2
1944	23,770	2,043	1,125	0.84	Nil	12 - 7 1/4
1945	24,480	2,414	1,549	1.15	Nil	19 1/4 - 11 1/4
1946	29,464	3,953	2,190	1.69	Nil	24 - 16 1/2
1947	48,997	10,670	6,157	4.77	1.00	22 1/2 - 15
Puget Sound Pulp & Timber Co. (Dec. 31):						
1937	3,043	311	255	0.72	0.75	19 1/2 - 7
1939	3,028	116	99	0.20	Nil	13 - 3 1/2
1941	8,379	3,123	1,076	3.08	2.00	18 1/2 - 14
1943	6,373	1,057	457	1.19	0.50	13 - 7
1944	6,469	h1,413	h938	h2.66	1.00	17 - 11 1/2
1945	6,217	h1,035	h603	h1.64	1.00	25 1/2 - 15 1/2
1946	7,188	2,130	1,321	3.83	1.00	27 - 18
1947	15,173	7,699	4,823	12.31	1.00	45 1/2 - 25 1/2
Rayonier Incorporated (a-April 30):						
1937	17,496	3,746	3,125	1.94	N.A.	N.A.
1939	16,292	2,887	2,389	1.18	Nil	19 - 6 1/2
1941	31,317	9,080	3,570	2.40	0.75	18 1/2 - 8 1/2
1943	22,824	2,489	1,689	0.45	0.87	15 1/2 - 11 1/4
1944	25,970	3,624	1,839	0.61	Nil	18 - 12 1/2
1945	27,033	2,075	1,503	0.26	Nil	25 - 16
1946	24,312	t4,065	t2,501	t1.68	Nil	33 - 17 1/4
1947	49,964	13,831	8,506	7.30	0.50	32 - 17 1/2
St. Regis Paper Co. (Dec. 31):						
1937	14,869	1,599	1,228	0.22	Nil	11 1/2 - 2 1/2
1939	15,359	705	548	0.06	Nil	4 1/2 - 1 1/2
1941	30,000	5,247	3,228	0.71	Nil	2 1/2 - 1 1/4
1943	25,528	2,910	1,856	0.38	Nil	4 1/2 - 1 1/2
1944	48,388	5,398	1,854	0.36	Nil	6 1/2 - 4 1/2
1945	52,501	4,344	2,211	0.94	Nil	12 - 5 1/2
1946	82,782	9,349	5,564	1.00	Nil	15 1/2 - 8 1/2
1947	143,865	23,956	14,631	2.66	0.25	12 - 9
Scott Paper Co. (Dec. 31):						
1937	13,844	1,603	1,249	2.19	1.55	45 1/4 - 34 1/2
1939	18,517	2,512	1,886	2.65	1.85	52 1/2 - 44 1/2
1941	27,076	3,277	1,940	2.52	1.95	39 1/2 - 31
1943	30,570	2,692	1,535	1.91	1.80	43 - 36 1/2
1944	31,467	2,972	1,566	1.96	1.80	45 1/2 - 37 1/2
1945	37,680	3,154	1,756	1.87	1.80	61 1/2 - 42 1/2
1946	46,223	3,347	2,020	2.03	1.80	61 - 42
1947	57,253	4,714	2,857	3.02	1.95	49 1/2 - 40 1/2
Sutherland Paper Co. (Dec. 31):						
1937	8,137	997	805	2.80	1.80	39 1/2 - 17 1/2
1939	8,490	866	723	2.52	1.30	30 1/2 - 22 1/2
1941	12,843	1,574	818	2.85	1.25	23 1/2 - 16 1/2
1943	15,479	2,541	818	2.85	1.25	33 - 26 1/2
1944	14,947	2,260	710	2.47	1.35	34 - 29
1945	14,908	1,470	609	2.12	1.35	42 1/2 - 31
1946	19,730	2,614	1,611	4.68	1.75	55 1/2 - 38
1947	25,178	3,814	2,364	6.87	2.50	47 - 36
Union Bag & Paper Corp. (Dec. 31):						
1937	15,691	1,675	1,385	1.32	0.50	18 1/2 - 8 1/2
1939	17,562	1,134	966	0.76	Nil	13 1/2 - 6
1941	27,871	5,619	2,168	1.70	1.00	12 1/2 - 7
1943	33,555	2,767	1,058	0.83	0.30	11 1/2 - 8
1944	39,021	6,722	1,584	1.23	0.75	15 1/2 - 9 1/4
1945	41,391	6,408	1,646	1.30	0.85	26 1/2 - 14 1/4
1946	44,871	8,970	5,255	4.13	1.30	39 - 23
1947	63,512	19,981	11,757	7.93	3.00	37 1/2 - 25 1/2
West Virginia Pulp & Paper Co. (Oct. 31):						
1937	31,413	3,516	2,862	2.14	0.70	41 - 15 1/2
1939	29,760	1,240	1,095	0.18	0.20	19 1/2 - 9 1/2
1941	47,321	6,820	4,520	3.97	1.80	20 1/2 - 15
1943	53,715	7,662	2,610	1.86	1.25	16 1/2 - 11 1/2
1944	59,098	6,484	2,384	1.80	1.00	28 - 16 1/2
1945	59,188	5,442	2,142	1.63	1.00	40 - 22 1/2
1946	67,212	8,954	5,104	4.93	2.40	53 1/2 - 32 1/2
1947	85,989	17,635	10,935	11.40	3.00	47 - 32 1/2
Columbia River Paper Mills (Dec. 31):						
1937	N.A.	62	47	1.05	N.A.	N.A.
1939	N.A.	N.A.	d53	d3.44	N.A.	N.A.
1941	N.A.	510	340	16.67	N.A.	N.A.
1943	N.A.	141	91	4.24	N.A.	N.A.
1944	N.A.	280	155	7.77	N.A.	N.A.
1945	N.A.	407	170	8.49	N.A.	N.A.
1946	N.A.	1,407	877	43.83	N.A.	N.A.
1947	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

and increased volume, aided by moderate price increases and by the benefits of plant additions and improvements becoming available during the year.

Despite spiraling costs and trying shortages, new records in production, sales and earnings were established for the fiscal year ended Oct. 31 by West Virginia Pulp and Paper Co. In achieving these results, the company said it faced the highest operating costs in its history. As the result of a year of uninterrupted operation, the company's six integrated pulp and paper plants produced a total of 637,542 tons of paper and paperboard, eclipsing 1946's record volume of 589,339 tons. The volume involved the production of 607,521 tons of pulp, 10.7 per cent more than in 1946. The production of chemicals also reached a new high in 1946.

Net sales of all products amounted to \$85,989,056, as compared with \$67,211,929 in 1946. After taxes and all charges, the company's earnings for the year were \$10,935,424, as compared with \$5,103,607 for the previous year. From these earnings the company paid \$3,356,902 in dividends to approximately 4,000 stockholders and retained \$6,262,026 for future needs.

David L. Luke, Jr., president, described 1947 as a "boom year, characterized by all the success—and uncertainties—of an 'uneasy prosperity.' For a business like ours, with the security of stockholders dependent upon the continuity of success," he said, "One or two boom years represent only a brief opportunity to accumulate reserves against the contingencies of the future." Today's distended economy, Mr. Luke said, makes it necessary for the company to maintain earnings at present levels because the cost of normal replacement now is far in excess of the funds allowed for depreciation and depletion.

The report disclosed that the company's 8,600 employees received a record total of \$23,481,775 in salaries and wages during the year. The payroll showed an increase of 21 per cent over the \$19,359,592 earned by the same number of employees in 1946. The average hourly rate increased 15 cents, bringing the total increase since the end of the war to an average of 37 cents an hour. Similar adjustments were made for salaried employees.

A combination of favorable circumstances, and a singular absence of the unfavorable, enabled Puget Sound Pulp & Timber Co. to convert 1947 into the best year in its history, F. G. Stevenot, president, stated in his annual report. Factors shaping the record included higher prices for the company's products, sufficient log supply to permit capacity operation commencing in May, profitable operation of the industrial alcohol plant recently purchased from the government, and savings in operation of the new hydraulic barker and whole log chipper.

Independently audited net income for 1947 amounted to \$4,822,901, as previously reported, including \$131,218 net capital gain, the equivalent of \$12.31 a share on 389,094 shares of common stock outstanding at the end of the year, compared with \$1,320,507, or \$3.83 a share on 326,940 shares of common stock outstanding in 1946.

Good earnings enabled the company to attain a nearly debt-free position in 1947. During the year a total of \$1,873,353 was paid on bank loans and other debts, eliminating all long-term debt except \$111,296 on timber contracts payable 1949-1955, and \$297,341 of current obligations for which provisions were made for payment in 1948. Debt retirement in 1947 included complete payment for the alcohol plant purchased at the beginning of the year.

F. G. Coburn, president of Brown Company, stated to stockholders that some time would probably elapse before reorganization takes place, although profits for 1947 are estimated to be \$2,800,000. All available funds will be needed for the company's progressing expansion program, he stated. It was pointed out that all earnings of the Brown Corporation, Canadian subsidiary, may not be paid under the foreign exchange control regulations. Net earnings available for dividends would amount to

approximately \$2,000,000. The big new sulfate mill at Berlin, New Hampshire, goes into production this Spring.

Kimberly-Clark Corp. announced earnings of \$4.22 per share of common stock for 1947, compared to \$3.15 last year. Net income was \$6,333,104.25 while the provision for preferred stock dividends was \$740,908 making a net income of \$7,074,012.25 for the year.

The statement is based on 1,499,520 shares outstanding last December and 1,199,520 shares outstanding December, 1946. These include some of the wholly-owned subsidiaries, K-C of Canada, Ltd, the William Bonifas Lumber Company, and North Star Timber Company. Net sales, according to the statement, were \$91,009,832.07 while net income before Federal, state and Canadian income taxes was \$11,168,824.31. Taxes were estimated at \$4,333,473.73 leaving a remainder of \$6,835,350.58 plus \$238,661.67 in net income of the lumber and timber companies.

Earnings in 1947 for Hinde & Dauch Paper Co. reached \$3,909,386.58 after deducting all taxes and charges—resulting in \$8.21 per share. After deducting \$1,500,000 for plant rearrangement, improvement and replacement, the earnings added to surplus amounted to \$2,409,386.58 or earnings of \$5.06 per share. Dividends paid were \$3.50 per share, in four quarterly dividends and a year-end slice of \$1.50 per share. Comparison with the previous year, the report points out, would not be appropriate due to the strike which interrupted H&D operations the last six months of 1946. Sales in 1947 were \$35,033,599.63 despite a "steady, conservative price policy which has not reached the high prices the market has paid." About over-capacity, Sidney Frohman, president, had this to say:

"In some quarters, some apprehension is expressed over the possible over-capacity in the industry caused by the construction of new southern kraft mills. Against this must be put the possibility of retirement from production of high-cost mills which have been producing to help satisfy the past demand. Nevertheless, it is the history of this industry that it depends upon and is affected by the cyclical experience of general business. It must also be remembered that this is a growing industry, whose new products are increasingly demanded by a growing list of manufacturers, for new products and in substitution for other materials. One needs but to point to the excess of births over deaths during the last two years as an indication of a growing population whose demands for paperboard-packaged commodities begins before birth and ends after death, assure this industry of a potential, growing market."

Rayonier Incorporated shows a substantial improvement in dollars sales and earnings for the year ended Dec. 31, 1947, according to its Annual Report. Sales amounted to \$49,964,041, compared with \$24,311,957 for the previous eight-month period reported, the short period being due to a change in the fiscal year during 1946.

Net income after all charges, including Federal income taxes of \$5,325,000, amounted to \$8,505,916 for the year which, after payment of Preferred Dividends, represented earnings of \$7.30 per share on the Common Stock. This compares with \$2,500,944 or \$1.68 per share, for the preceding eight-month period.

Dividends on the Common Stock were resumed in October, 1947, after a lapse since 1943, by the payment of fifty cents a share for the last half of the year. In February, 1948, the Common Stock was placed on a regular quarterly basis when a dividend of 25 cents was paid for the first quarter.

President Edward Bartsch states that the most significant development during the year was the acquisition of a controlling interest in the Polson Logging Co. which owns extensive forest properties in the State of Washington. He points out that wood is the principal raw material entering into Rayonier's products, and states that these forests, together with Rayonier's other large forest holdings, will assure sufficient wood for the con-

COMPARATIVE OPERATING RESULTS AND PER SHARE STATISTICS

(Sales, Profits and Income in Thousands of Dollars)

	Net Sales	*Pre-Tax Profits	*Net Income	†Earned oDividends	↑ Per Common Share oPrice	Range
Soundview Pulp Co. (Dec. 31):						
1937	6,537	1,987	1,627	1.54	1.50	N.A.
1939	5,768	679	565	0.45	0.12½	14½ - 5½
1941	13,019	4,814	1,794	1.71	1.00	11½ - 6½
1943	10,706	1,845	810	0.70	1.00	10½ - 7½
1944	11,682	1,991	754	0.65	0.70	11½ - 9½
1945	10,386	1,330	838	0.73	0.60	18 - 10½
1946	12,359	3,197	2,017	1.94	0.70	22½ - 15
1947	24,654	10,711	7,140	7.25	2.00	33½ - 21½
Canadian—						
Abitibi Power & Paper Co., Ltd. (Dec. 31):						
1937	21,755	3,054	3,054	¶0.67	Nil	v
1939	16,146	1,660	1,660	¶0.45	Nil	v
1941	27,038	5,626	5,626	¶2.75	Nil	v
1943	29,940	11,931	1931	¶d1.04	Nil	v
1944	28,211	12,294	11,044	¶d0.95	Nil	v
1946	N.A.	13,875	5,600	2.72	Nil	22½ - 14
1947	63,340	18,363	8,563	5.11	Nil	19½ - 13½
British Columbia Pulp & Paper Co., Ltd. (Dec. 31):						
1937	N.A.	355	225	1.86	Nil	48 - 9
1939	N.A.	d138	d147	d1.86	Nil	10 - 6
1941	N.A.	2,101	601	5.62	Nil	11 - 7
1943	N.A.	264	164	1.25	Nil	8 - 8
1944	N.A.	653	368	3.29	Nil	38 - 14½
1945	N.A.	978	440	4.01	Nil	63 - 36½
1946	N.A.	1,991	991	9.52	Nil	78 - 46
1947	N.A.	5,156	2,556	25.17	Nil	62 - 43½
Consolidated Paper Corp. Ltd. (Dec. 31):						
1940	N.A.	1,282	875	0.34	Nil	8½ - 3½
1941	N.A.	1,520	880	0.34	Nil	4½ - 2½
1943	N.A.	2,294	1,294	0.50	Nil	6½ - 3
1944	N.A.	2,708	1,108	0.43	Nil	9½ - 5½
1945	N.A.	3,689	1,789	0.70	Nil	17 - 8
1946	N.A.	10,659	4,859	1.89	s0.50	21½ - 14½
1947	N.A.	N.A.	N.A.	N.A.	s1.50	18½ - 14½
Donnacona Paper Co., Ltd. (Dec. 31):						
1937	N.A.	50	41	0.11	Nil	17½ - 7½
1939	N.A.	11	9	0.02	Nil	N.A.
1941	N.A.	183	105	0.28	s0.10	3½ - 3½
1943	N.A.	345	195	0.52	Nil	7½ - 3½
1944	N.A.	474	274	0.72	Nil	11½ - 7
1945	N.A.	539	289	0.77	s0.50	18½ - 9½
1946	N.A.	1,479	776	1.87	s0.75	24 - 15
1947	N.A.	2,290	1,245	3.00	s1.50	19½ - 15½
Powell River Co., Ltd. (Dec. 31):						
1937	N.A.	1,977	1,481	1.11	N.A.	N.A.
1939	N.A.	3,548	2,602	1.94	N.A.	N.A.
1941	N.A.	5,627	2,672	1.99	s1.80	N.A.
1943	N.A.	4,306	1,737	1.2	s1.27	N.A.
1944	N.A.	4,526	2,107	1.57	s1.05	N.A.
1945	N.A.	5,132	2,027	1.51	s1.05	30½ - 18½
1946	N.A.	6,806	3,440	2.56	s1.60	36½ - 28
1947	N.A.	10,591	6,012	4.47	s2.75	34½ - 29½

¶Adjusted to reflect present capitalization effective April 15, 1946.

*Adjusted for effects of renegotiation (where reported) and inclusion of special voluntary reserves created after taxes. †Adjusted for split-ups. ‡Disregarding preferred stock dividend arrears, if any. o-Calendar years. N.A.-Not available. d-Deficit. **Not comparable with later years due to recapitalization in 1940.

a-In order to conform with data for other companies, fiscal periods are those ending April 30 of following year.

b-Since reorganization. c-Per share statistics are for preferred stock.

d-Paid in 6% preferred stock (retired in 1944) g-6% stock dividend.

¶Plus 10% in stock. (Footnotes to Balance Sheet Data should be read in conjunction herewith).

h-Includes capital gain from sale of Canadian subsidiary.

i-After deducting interest reserve payable.

m-Nine months to Jan. 31, 1948, except dividends and price range which are for full year

o-Calendar year.

p-Earnings revised from data previously reported to stockholders by company; adjustments mainly for depreciation.

r-40 weeks to Feb. 1, 1948.

s-Paid in Canadian funds.

t-40 weeks to Feb. 1, 1948.

u-Reorganization consummated April 15th; earnings are for full year.

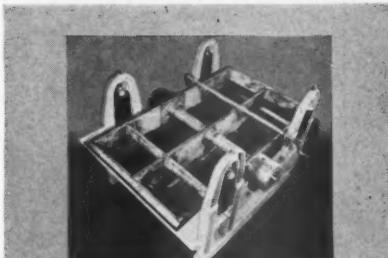
v-Not comparable with present common shares due to reorganization.

1948 REVIEW OF BIRD MACHINERY

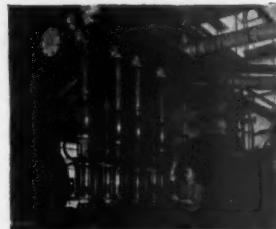
for making better pulp and paper and more of it per day
at lower cost per ton



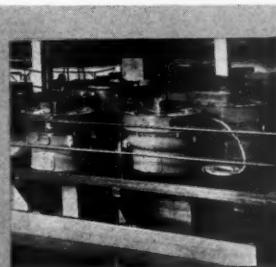
BIRD SCREENS are the standard of the world — handle 80% of all the paper stock in North America. They are essential for continuous, maximum production of uniformly good paper.



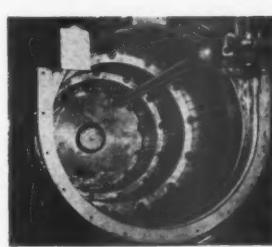
JONSSON SCREENS are ideal for knotting all kinds of pulp with negligible loss of good fibres in the tailings; outstanding, also, for screening defibered wood, straw stocks, waste paper and de-linked stocks.



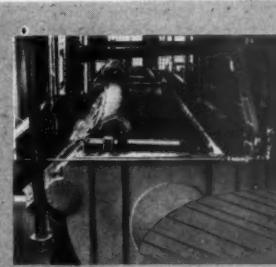
DIRTECS are being widely adopted and endorsed by all kinds of mills as most effective and economical removers of heavy and fine dirt both ahead of the Bird Screens and as tailings units.



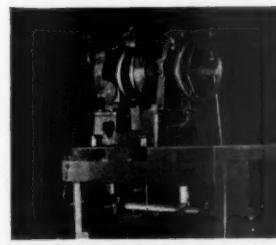
BIRD CENTRIFINERS provide triple centrifugal treatment for separating specks of dirt, metal, rubber, etc. from high grade writings, condenser papers and other specialties.



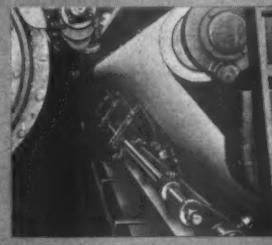
BIRD OSCILLATING SHOWER PIPES keep screens and cylinder molds clean with a fraction of the shower water formerly used. Savings in water, fibre and heat quickly pay for them.



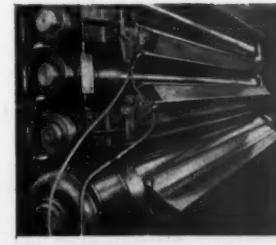
BIRD SAVE-ALLS are the standard means of recovering good papermaking fibres from paper machine waste water. They assure lowest net cost per pound of fibre recovered.



BIRD CONSISTENCY REGULATORS are proving the most dependable and trouble-free means of controlling pulp and paper stock consistency at every desired point. Consistency is held to not more than 0.1% heavier or lighter than desired.



VICKERY FELT CONDITIONERS keep press felts continuously clean and absorbent without midweek shutdowns, improve quality and uniformity and assure maximum water removal at the presses.



VICKERY DOCTORS are engineered for each individual press roll, wire roll, dryer, calender and super-calender roll. Roll surfaces are always clean and shining, in shape to do their best work continuously.

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BIRD MACHINE COMPANY
SOUTH WALPOLE • MASSACHUSETTS

COMPARATIVE SALIENT BALANCE SHEET DATA
(In Thousands of Dollars)

Fiscal Year-end	*Total Assets	*Net Fixed Assets	Inven-tories	Net Working Capital	Funded Pre-Debt, etc.	Stock	Pre-ferred Stock	Minority Interests	†No. Com. Shares Outstanding
b American Writing Paper Corp. (Dec. 31):									
1937	\$8,782	\$6,487	\$1,173	\$1,980	\$3,072	Nil	Nil	Nil	416,028
1939	8,840	6,272	1,414	1,877	2,316	Nil	Nil	Nil	416,068
1944	9,596	4,924	1,040	3,638	2,006	Nil	Nil	Nil	360,224
1945	9,394	4,816	1,323	3,032	1,506	Nil	Nil	Nil	360,224
1946	9,585	4,771	1,459	3,272	833	Nil	Nil	Nil	360,224
1947	9,233	4,848	2,209	2,942	Nil	Nil	Nil	Nil	357,224
c Brown Co. (Nov. 30):									
1941	44,854	26,205	7,424	12,887	17,349	p14,448	Nil	1,999,659	
1942	43,104	23,303	8,803	11,774	14,833	p14,448	Nil	1,999,659	
1944	42,146	22,429	10,276	13,746	15,327	p14,448	Nil	1,999,659	
1945	43,031	21,857	6,986	14,328	15,099	p14,448	Nil	1,999,659	
1946	49,706	23,696	8,326	16,399	19,099	p14,448	Nil	1,999,629	
1947	54,014	26,641	9,664	16,114	18,799	p14,448	Nil	1,999,629	
Champion Paper & Fibre Co. (a April 30):									
1936	32,150	21,688	3,076	4,464	5,013	7,750	Nil	1,102,000	
1939	38,385	26,582	5,026	6,401	10,415	8,779	Nil	1,101,400	
1943	50,236	24,385	7,344	20,344	11,455	11,500	84	1,100,000	
1944	51,899	23,336	7,284	20,905	10,900	11,500	103	1,092,000	
1945	51,404	26,694	8,310	18,752	13,096	10,000	121	1,102,000	
1946	59,523	33,896	10,266	15,221	12,985	10,000	210	1,102,000	
Columbia River Paper Mills (Dec. 31):									
1936	3,910	3,554	360	474	635	p680	Nil	20,000	
1939	4,422	2,698	664	706	1,503	p200	Nil	20,000	
1943	4,741	2,558	815	1,130	1,305	p77	Nil	20,000	
1944	4,563	2,273	912	1,085	911	Nil	Nil	20,000	
1945	4,884	2,251	1,088	1,008	776	Nil	Nil	20,000	
1946	6,391	2,373	1,520	1,646	538	Nil	Nil	20,000	
1947	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
Consolidated Paper Co. (Dec. 31):									
1936	11,344	7,036	1,378	3,282	Nil	Nil	Nil	750,000	
1939	8,755	3,469	1,790	4,292	Nil	Nil	Nil	750,000	
1944	12,368	2,238	1,260	6,717	Nil	Nil	Nil	750,000	
1945	12,148	2,413	2,085	7,091	Nil	Nil	Nil	750,000	
1946	13,115	2,996	2,011	7,121	Nil	Nil	Nil	750,000	
1947	16,459	4,225	2,660	7,722	Nil	Nil	Nil	750,000	
Container Corp. of America (Dec. 31):									
1936	23,633	17,371	2,901	3,544	6,981	Nil	Nil	653,540	
1939	26,110	17,617	3,644	4,710	5,126	Nil	Nil	781,253	
1944	28,119	15,500	3,737	6,635	Nil	Nil	Nil	781,253	
1945	30,529	13,499	4,529	9,078	Nil	Nil	Nil	781,253	
1946	42,893	19,191	6,136	k14,080	Nil	Nil	Nil	990,476	
1947	58,633	27,796	9,271	k23,243	Nil	10,000	Nil	990,476	
Crown Zellerbach Corp. (a April 30):									
1936	104,600	66,382	11,913	13,204	19,278	52,965	1,212	2,261,199	
1939	103,037	62,653	12,741	17,703	13,800	52,966	1,187	2,261,199	
1943	105,164	60,386	18,591	29,814	2,573	52,966	1,254	2,261,199	
1944	105,706	58,505	16,400	30,599	Nil	52,966	1,262	2,261,199	
1945	111,609	62,394	19,125	32,319	2,621	52,801	1,257	2,267,375	
1946	129,000	72,982	25,875	33,725	6,128	46,607	1,255	2,499,646	
Eddy Paper Corp. (Dec. 31):									
1936	6,730	4,532	1,407	1,491	105	Nil	Nil	177,900	
1939	8,157	4,389	1,119	1,134	488	Nil	Nil	180,045	
1944	11,299	1,944	998	3,745	Nil	Nil	Nil	164,535	
1945	10,883	1,574	1,093	4,895	Nil	Nil	Nil	614,535	
1946	10,559	1,592	1,196	5,827	Nil	Nil	Nil	164,530	
1947	13,310	2,157	1,584	k5,214	Nil	Nil	Nil	164,527	
Gair (Robert) Co., Inc. (Dec. 31):									
1936	18,469	12,529	3,076	2,902	4,825	p9,280	650	574,613	
1939	17,093	7,819	2,032	1,662	3,563	p9,310	650	574,646	
1944	15,552	7,672	2,032	4,126	3,305	3,728	650	1,133,822	
1945	17,427	7,988	2,891	5,727	3,000	5,680	650	1,231,447	
1946	29,894	7,701	2,720	5,655	9,475	5,680	650	1,740,440	
1947	36,836	10,559	4,207	7,238	10,864	5,976	650	1,779,888	
d Gaylord Container Corp. (Dec. 31):									
1937	12,872	7,765	1,518	3,445	Nil	5,000	Nil	1,617,663	
1939	12,967	8,034	1,604	3,266	Nil	5,315	Nil	1,617,663	
1944	21,245	11,028	3,607	7,177	5,187	4,511	Nil	1,625,463	
1945	21,169	8,231	3,504	10,155	4,842	4,483	Nil	1,665,933	
1946	24,129	9,428	3,969	11,728	4,497	1,654	Nil	2,025,085	
1947	26,467	12,288	4,621	10,964	Nil	Nil	Nil	2,338,317	
Great Northern Paper Co. (Dec. 31):									
1936	42,604	27,217	7,740	13,356	120	Nil	Nil	997,580	
1939	43,567	29,057	6,436	12,684	144	Nil	Nil	997,480	
1944	44,774	28,996	5,663	12,700	24	Nil	Nil	997,480	
1945	45,550	30,003	6,729	12,210	956	Nil	Nil	997,480	
1946	46,884	29,297	8,396	13,224	637	Nil	Nil	997,480	
1947	49,269	28,935	8,807	14,521	319	Nil	Nil	997,480	

(Continued on page 82)

tinued operation of the Company's three Northwest mills for many years. The consolidated balance sheet as of December 31, 1947, shows current assets of \$22,746,876, and current liabilities of \$6,265,875, a ratio of 3.63.

New construction, increased timber holdings, improvements, and extensions into end-use were reflected in the annual report of the St. Regis Paper Co. In 1947 the company produced 369,637 tons of pulp, 506,255 tons of paper, 190,508 tons of bag production, and 25,000,000 pounds capacity of plastics from paper.

"It was," said Roy K. Ferguson, president, "a year of new records for St. Regis and its subsidiaries. For the first time our total assets exceeded \$130,000,000. For the first time our 12 months sales exceeded \$140,000,000. For the first time our net earnings for the year exceeded \$14,000,000. The improved financial position reached by the Company in 1947 made it possible for the Board of Directors to declare a dividend on the common stock, the first in sixteen years, the company's affairs having been under direction of the present management for the past twelve years. A regular dividend of 15 cents per share and a special dividend of 10 cents per share in the fourth quarter were declared, payable December 1st to stockholders of record on November 7, 1947. During the past 12 years of the present management the earnings averaged more than 7% on net sales. However, we agreed that the best policy would be to strengthen the financial position of your company by retaining these earnings in the business, reinvesting them in modernization, improvements, new plants and additional working capital. The total amount of earnings and proceeds from sales of securities invested in the company during this period amounted to over \$60,000,000.

"A manufacturing business has certain basic needs, Capital, Raw Materials, Production, Products, Markets, Sales, Profits," said Mr. Ferguson. "For the past 12 years the policies of your management have been designed to meet these needs as they applied to the Company and subsidiaries. We have provided the necessary capital; we have insured ample supplies of raw materials by adding to our timber holdings, cutting rights and arranging long term wood-pulp contracts; we have increased production by improving facilities and methods, building new plants and acquiring other plants already built; we have instituted an integrated sales program fortified by important long term printing paper contracts, increased acceptance and use of Panelyte plastic in certain basic industries and continued expansion of markets for multiwall paper bags; we have coordinated all divisions of the company's business into a profit earning unit. The progress as detailed in this report would seem to confirm the soundness of these policies."

Consolidated net profit for 1947 in the Container Corp. of America was \$10,273,603 compared with \$7,165,561 in 1946, these figures being after all charges. Net profit amounted to \$10.09 a share of common stock after providing dividends of \$277,333 on the preferred stock since date of issue, April 15, 1947. This compared with \$7.21 a share for 1946. Net sales were \$128,345,675 as compared with \$91,090,286 in 1946 and \$74,138,191 in 1945. Capital expenditures in CCA totaled \$9,602,406 and were in two categories: conversion from pulp production to kraft container board manufacture at Fernandina, and a multiplicity of expenditures for improvements and modernization of power plants, paper mills, and fabricating machinery. The CCA report stressed a five-year comparison. Number of employees went from 6,428 in 1943 to 10,860 in 1947; tonnage from 598,918 to 675,583; net profit from \$2,184,054 to \$10,273,603; dividends paid and/or declared \$1,171,879 to \$4,801,133; invested capital per employee \$3,545 to \$4,818 which is more than twice the average of the industry; earned increase in earned surplus \$903,983 to \$5,361,679.

Notable in the pulp producing field was the record of Soundview Pulp Co. as reflected in its annual report. Production, sales and profits for the year were highest in the company's history. Dollar value of sales was



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\$24,654,020, and net profit amounted to \$6,611,072 after all operating charges including depreciation, depletion, amortization and Federal taxes. Interesting in this report is the data that log costs were five dollars per thousand feet above the previous year and nearly four times the average cost in pre-war years. With such high log costs the saving of 20 percent of wood accomplished by Soundview's hydraulic barker and whole log chipper became at once an important factor in earning profits. During the year the company purchased timber about equal to that cut on its timberlands, and much effort was devoted to salvage small trees and waste on cut-over lands. Use of salvaged material was enhanced by installation of three small hydraulic barkers, and wood from this source amounted to 10 percent of mill consumption.

The profit and loss statements of Soundview for 1946 and 1947 are among the most interesting in the industry. Sales were almost doubled in dollar value in 1947—\$24,654,020 as compared with \$12,359,198. Costs on this volume were kept surprisingly low—\$12,848,975 as compared with \$8,326,152 in 1946. The figure for operating expenses and contingent reserves was less in 1947 (\$260,295) than in 1946 (\$302,404). But Federal taxes went from \$1,180,000 in 1946 to \$4,100,000 last year. Net profit was \$6,611,072 as compared with \$1,900,544 in 1946.

Scott Paper Co. in its report reflected "the maintenance of a sound price structure as a strong foundation for the future, and continued to emphasize its fundamental objectives: (1) to supply the consumer with quality products at lowest possible prices, (2) to provide employees with steady work at good pay in pleasant, safe surroundings, and (3) to earn a reasonable return on the investment of shareholders."

"Despite the fact that both physical volume of production and dollar sales reached an all-time record in 1947, consumer demand for Scott products continued to exceed the available supply," the report continues. "The scarcity of ScotTowels, ScotTissue and Waldorf during the year was accentuated by the loss of almost the entire production of the giant towel-making machine at Chester, damaged in September 1946 and not restored to operation until the end of 1947. While this machine was being rebuilt, toweling stock was produced on another paper machine which normally makes toilet tissue. The allotment program, adopted during the war years, was continued to assure fair and equitable distribution of Scott products among the Company's customers."

Net sales amounted to \$57,252,636, and increase of \$11,029,832 over 1946.

American Writing Paper Corp., through its president and chairman of the board Thomas H. Blodgett, reported a net profit of \$547,490.28 as compared with \$305,818.09 the previous year. Bank loans and general mortgage bonds were discharged by payment prior to December 31, 1947. A dividend of twenty-cents per share was made December 20th to holders of record of common stock on December 5, 1947. Mr Blodgett reported that shortages had delayed phases of rehabilitation and modernization program which this company plans, but, he said, there will be every effort to continue the plans earlier conceived to maintain the high position of the company's products in a very competitive market.

During 1947 the Sutherland Paper Co. reported the spending of \$1,827,060 on capital additions to plant facilities, chiefly for new buildings and new converting equipment. Net sales were \$25,177,987 as compared with \$19,729,536 in 1946, an increase of 28 percent. Net profits were equal to \$6.87 per share as compared with \$4.68 per share for 1946, an increase of 47 percent. From these increased earnings the directors declared dividends totaling \$2.50 per share during 1947 as compared with \$1.75 per share during 1946. A new paperboard mill has been authorized here and work has begun.

Canadian Company Reports

Financial reports of Canadian pulp and paper companies issued during the past few weeks reflect

COMPARATIVE SALIENT BALANCE SHEET DATA (In Thousands of Dollars)

Fiscal Year-end	Total Assets	*Net Fixed Assets	Inven-tories	Net Working Capital	Funded Debt, etc.	Pre-ferred Stock	Minority Interests	†No. Com. Shares Outstanding
Hammermill Paper Co. (Dec. 31):								
1936	11,882	6,309	1,805	2,833	270	3,803	Nil	180,000
1939	11,051	5,717	2,097	3,790	Nil	2,500	Nil	180,000
1944	12,716	5,204	1,912	5,180	Nil	2,420	Nil	180,000
1945	18,710	5,483	2,476	5,930	5,000	3,670	Nil	180,000
1946	20,232	8,544	3,081	7,251	5,000	3,670	Nil	180,000
1947	22,369	11,465	5,348	7,801	5,000	3,670	Nil	180,000
Hinde & Dauch Paper Co. (Dec. 31):								
1936	11,897	5,754	1,972	3,307	490	3,608	Nil	360,000
1939	12,565	5,987	2,085	3,702	544	3,590	Nil	360,250
1944	14,648	5,315	2,408	5,154	Nil	3,590	Nil	360,250
1945	14,997	5,368	2,538	5,655	Nil	1,470	Nil	427,824
1946	16,434	6,793	2,694	6,247	Nil	Nil	Nil	476,379
1947	18,614	7,591	3,234	7,677	Nil	Nil	Nil	476,379
e International Paper Co. (Dec. 31):								
1936	240,555	179,178	26,588	35,250	80,730	p91,349	15,833	1,822,243
1939	219,867	158,507	25,600	35,605	58,851	p92,594	2,026	1,823,270
1944	249,196	131,402	29,228	71,122	48,796	p92,597	316	1,823,855
1945	252,358	128,125	32,054	65,465	46,568	92,596	179	1,863,862
1946	252,533	134,229	43,104	k70,089	18,120	23,000	179	3,560,000
1947	278,586	147,733	52,653	k87,721	Nil	23,000	179	3,560,000
Kimberly-Clark Corp. (Dec. 31):								
1936	45,788	28,246	4,096	4,004	5,116	9,963	Nil	974,346
1939	50,858	24,508	5,141	7,688	8,600	9,963	Nil	976,346
1944	61,771	30,816	7,447	15,936	9,528	10,242	Nil	1,199,520
1945	64,337	33,741	8,160	16,785	10,000	10,242	Nil	1,199,520
1946	74,887	43,131	10,842	16,937	10,000	17,242	Nil	1,199,520
1947	99,168	62,539	15,806	19,203	20,400	17,242	Nil	1,499,520
Marathon Corp. (Oct. 31):								
1936	10,966	7,160	2,199	2,425	2,350	600	Nil	800,000
1939	14,307	7,186	3,499	4,512	3,597	1,199	28	798,268
1944	29,781	9,484	4,702	16,288	10,136	5,000	61	800,000
1945	31,280	15,689	6,442	11,067	10,071	5,000	66	800,000
1946	44,543	24,724	10,613	12,550	5,424	5,000	Nil	1,300,000
1947	52,670	28,945	14,128	13,975	8,074	4,925	Nil	1,300,000
Mead Corp. (Dec. 31):								
1936	29,752	20,665	3,720	4,326	7,240	3,315	1,023	619,374
1939	34,525	21,904	4,237	5,790	7,536	8,114	876	619,374
1944	37,387	19,756	5,616	9,586	6,000	7,983	153	693,610
1945	39,615	19,922	7,213	10,222	8,000	7,971	164	693,613
1946	51,716	23,944	9,060	12,684	12,000	12,052	186	707,424
1947	58,862	28,421	12,114	12,859	12,000	12,021	189	707,492
h Minnesota & Ontario Paper Co. (Dec. 31):								
1941	44,138	29,991	4,630	8,789	9,757	Nil	Nil	1,344,544
1944	45,180	27,338	5,801	10,982	6,310	Nil	Nil	1,344,543
1945	46,810	28,503	6,587	11,138	5,700	Nil	Nil	1,344,543
1946	48,515	29,993	9,708	11,307	2,842	Nil	Nil	1,292,522
1947	56,062	33,917	10,064	11,663	2,684	Nil	Nil	1,289,994
f National Container Corp. (Dec. 31):								
1937	6,458	5,017	343	640	2,247	Nil	Nil	1,982,892
1939	6,787	5,188	416	709	2,343	Nil	7	1,982,892
1944	12,328	6,918	1,372	2,553	4,522	Nil	44	1,982,892
1945	15,180	8,274	2,361	4,192	4,260	2,212	54	2,028,990
1946	23,840	12,000	3,748	4,930	4,714	1,063	219	2,433,540
1947	30,566	15,340	4,541	5,947	1,857	197	96	2,639,955
Oxford Paper Co. (Dec. 31):								
1936	28,560	17,426	2,242	3,803	4,580	p 8,287	Nil	340,172
1939	28,833	16,919	2,603	4,273	4,490	p 10,231	Nil	380,735
1944	27,607	14,836	3,257	k8,527	1,890	p 10,143	Nil	380,735
1945	28,413	14,415	5,370	k10,334	1,700	p 10,143	Nil	380,735
1946	40,317	16,256	5,542	k18,078	9,048	p 10,143	Nil	380,735
1947	41,552	22,188	7,081	k14,125	8,012	10,143	Nil	380,735
Puget Sound Pulp & Timber Co. (Dec. 31):								
1937	7,146	4,841	393	350	23	2,473	Nil	251,837
1939	5,642	4,712	265	270	11	2,473	Nil	251,837
1944	10,097	4,444	726	1,027	488	1,121	Nil	326,918
1945	10,543	4,743	613	907	1,221	1,121	Nil	326,940
1946	12,377	5,439	920	1,269	1,413	1,121	Nil	326,940
1947	16,343	7,074	2,372	2,041	111	2	Nil	389,094
g Rayonier Inc. (a April 30):								
1937	21,435	17,378	2,161	1,248	425	15,655	Nil	963,872
1939	31,530	24,124	3,559	4,322	6,500	15,655	Nil	963,871
1943	30,433	22,330	3,822	5,000	3,427	15,655	Nil	963,871
1944	37,072	23,539	3,550	k9,954	9,119	15,655	Nil	963,871
1945	35,869	22,528	3,727	k10,104	8,266	15,655	Nil	963,871
1946	39,400	23,520	4,986	k11,521	8,419	15,655	Nil	993,871
1947	62,524	37,674	7,474	k17,206	18,591	15,655	3,739	993,871
St. Regis Paper Co. (Dec. 31):								
1936	58,698	27,704	3,173	4,325	6,910	p 4,428	915	4,120,714
1939	59,123	27,278	3,066	6,279	7,899	p 4,428	874	4,120,714
1944	58,777	32,179	8,373	18,455	9,708	p 7,372	3,345	4,120,714
1945	69,794	31,230	11,638	23,031	15,082	p 7,207	2,405	4,120,714
1946	99,170	53,845	20,590	29,070	16,756	20,000	1,135	5,170,714
1947	132,644	72,869	30,297	36,444	34,273	19,019	656	5,170,714

(Continued on page 84)

58 agree...on the problem and solution

Handling the enormous quantities of air required in the making of paper presents one of the major engineering problems that confront the industry. How this raw material—air—is supplied, applied and removed, has a distinct bearing on production and profit. That leading manufacturers understand the importance of the problem and agree on the most effective means of solving it is evidenced by the fact that practically all new machines installed since 1945 have been equipped with ROSS Air Systems. Handling air the right way is to handle it the ROSS way.

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COMPARATIVE SALIENT BALANCE SHEET DATA (Cont.)
(In Thousands of Dollars)

Fiscal Year-end	Total Assets	*Net Fixed Assets	Inven-tories	Net Working Capital	Funded Debt, etc.	Pre-ferred Stock	Minority Interests	†No. Com. Shares Outstanding
Scott Paper Co. (Dec. 31):								
1936	7,749	4,508	1,710	2,146	Nil	Nil	Nil	569,980
1939	20,230	9,219	2,380	5,575	702	6,034	Nil	667,956
1944	22,362	9,851	2,613	7,123	Nil	6,030	Nil	667,942
1945	25,976	11,566	5,979	7,760	Nil	6,030	Nil	804,782
1946	28,804	13,313	5,015	9,627	Nil	6,589	Nil	871,861
1947	33,208	14,713	8,509	9,021	Nil	6,589	Nil	871,847
Soundview Pulp Co. (Dec. 31):								
1936	7,431	5,848	576	448	900	293	Nil	937,000
1939	11,218	8,901	1,429	1,323	1,040	2,108	Nil	976,500
1944	12,619	7,860	1,442	1,656	Nil	2,108	Nil	976,500
1945	11,690	8,001	968	2,189	Nil	2,108	Nil	976,500
1946	13,874	8,994	1,532	1,436	Nil	2,108	Nil	976,500
1947	17,369	9,710	3,037	3,192	Nil	Nil	Nil	976,500
Sutherland Paper Co. (Dec. 31):								
1936	4,826	2,728	924	1,558	Nil	Nil	Nil	287,000
1939	6,515	3,335	2,291	1,732	Nil	Nil	Nil	287,000
1944	7,996	4,078	2,012	2,788	Nil	Nil	Nil	287,000
1945	9,767	3,995	2,359	4,730	1,500	Nil	Nil	287,000
1946	12,081	5,136	2,727	5,082	Nil	Nil	Nil	344,000
1947	15,350	6,613	4,952	5,144	Nil	Nil	Nil	344,000
Union Bag & Paper Corp. (Dec. 31):								
1936	12,715	8,679	2,112	2,946	2,077	Nil	Nil	1,045,732
1939	20,244	14,813	2,397	4,116	4,997	Nil	Nil	1,262,730
1944	26,473	15,870	3,416	6,943	5,859	Nil	Nil	1,271,437
1945	22,425	12,841	3,474	7,301	2,946	Nil	Nil	1,271,437
1946	28,385	16,379	4,613	8,357	4,136	Nil	Nil	1,271,437
1947	42,323	22,343	5,710	14,744	3,596	Nil	Nil	1,483,298
West Virginia Pulp & Paper Co. (Oct. 31):								
1936	56,437	32,855	5,530	12,027	4,000	15,524	Nil	902,660
1939	61,553	38,246	6,793	16,652	9,591	15,583	Nil	902,432
1944	59,343	29,665	6,761	k22,136	Nil	15,281	Nil	902,432
1945	63,524	28,201	6,860	k27,806	Nil	14,825	Nil	902,432
1946	67,369	32,187	10,272	k28,263	Nil	14,435	Nil	902,432
1947	73,386	37,996	11,192	k31,528	Nil	14,435	Nil	902,432
Canadian— r Abitibi Power & Paper Co., Ltd. (Dec. 31):								
1936	121,956	68,599	3,073	2,241	50,485	p35,882	Nil	1,088,117
1939	121,679	65,139	5,895	10,773	50,895	p35,882	Nil	1,088,117
1943	130,324	46,638	7,645	25,532	71,343	p35,882	Nil	1,088,117
1944	127,504	44,120	8,347	24,260	66,629	p35,882	Nil	1,088,117
1945	123,378	41,866	9,996	26,895	62,988	p35,882	Nil	1,088,117
1946	124,869	82,672	17,529	24,248	53,094	28,907	Nil	1,241,694
1947	128,982	86,217	27,342	15,835	42,465	28,905	Nil	1,241,694
British Columbia Pulp & Paper Co., Ltd. (Dec. 31):								
1936	9,015	6,642	556	795	5,177	p556	Nil	100,000
1939	11,161	7,321	894	143	5,311	p556	Nil	100,000
1943	11,506	7,447	1,311	1,693	5,731	p556	Nil	100,000
1944	12,305	8,176	1,410	2,234	4,970	p556	Nil	100,000
1945	12,311	7,797	1,530	1,869	4,841	p556	Nil	100,000
1946	14,417	9,638	1,914	600	4,089	p556	Nil	100,000
1947	19,016	11,255	3,364	3,062	6,000	p556	Nil	100,000
Consolidated Paper Corp., Ltd. (Dec. 31):								
1936	67,925	56,615	5,840	d725	52,096	Nil	Nil	2,308,789
1939	60,153	47,367	7,897	7,413	51,565	Nil	Nil	2,308,789
1944	63,782	28,898	12,666	25,812	43,847	Nil	Nil	2,562,702
1945	61,055	24,980	15,219	27,112	42,260	Nil	Nil	2,563,073
1946	75,425	38,631	22,501	24,705	35,028	Nil	Nil	2,564,195
1947	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Donnacona Paper Co., Ltd. (Dec. 31):								
1936	12,392	10,890	907	777	6,584	Nil	Nil	376,572
1939	14,029	11,615	1,257	1,341	7,263	Nil	Nil	376,572
1944	15,823	12,219	2,266	2,447	5,860	Nil	Nil	376,572
1945	16,958	12,925	2,458	2,209	5,860	Nil	Nil	376,572
1946	19,073	13,116	3,521	4,424	4,988	2,500	Nil	376,572
1947	17,045	10,462	5,077	3,647	6,500	2,500	Nil	376,572
Powell River Co., Ltd. (Dec. 31):								
1943	38,964	31,532	2,083	3,568	Nil	Nil	368	1,344,695
1944	40,537	31,603	2,186	5,377	Nil	Nil	Nil	1,344,695
1945	43,126	32,861	2,275	5,574	Nil	Nil	Nil	1,344,695
1946	47,632	35,837	2,429	9,355	Nil	Nil	Nil	1,344,695
1947	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

*Does not include investments and/or interests in companies not consolidated. †Adjusted for split-ups.

—In order to conform with data for other companies, fiscal years given are for period ending April 30th of year following: b-Reorganized in March, 1937. c-Reorganized in December, 1939. d-Organized (consolidation) in June, 1937. e-Organized in June, 1941; principal predecessor re-capitalized in September, 1937. f-Organized in March, 1937. g-Organized (consolidation in November, 1937. h-Reorganized in February, 1941. i-Organized in November, 1937. j-Organized (consolidation in November, 1937. k-Includes non-current construction fund and segregated security holdings.

Funded debt includes deferred interest on bonds where such condition exists.

Note: The foregoing information has been obtained from sources believed to be reliable but is not guaranteed.

the period of unprecedented activity through which they have been going, and most of them indicate that the past year's operations have been decidedly profitable.

While profits have been substantially increased in most cases, several of the companies are still in the process of rehabilitating themselves after a long era of depression, and others are plowing back a large proportion of their income into new construction or modernization of existing mills.

Net earnings of Fraser Companies reached a new peak of \$3,981,356, compared with \$1,964,031 for the previous year. With new production records established, the result of greater operating efficiency, operating earnings rose to \$9,045,248 for 1947, compared with \$5,735,532 in the previous year.

The organization spent \$4,479,000 on new plants and improvements and purchase of timber. It expects that its new unbleached sulfate mill at Newcastle, N. B., will be in operation next year.

Donocona Paper Co. reports net sales for the year 30% in excess of those for 1946, or \$12,474,846, compared with \$9,540,551 the previous year, and operating profits were 35 percent greater at \$3,168,542. Net earnings, after all charges, are up over 60 percent at \$1,245,174. The company completed acquisition of considerable additional timber at a cost of \$2,410,000, and spent \$789,000 on improvements of its properties.

The annual report of Abitibi Power & Paper Co., for the first full year since receivership was lifted, shows production and sales at new high levels, the operating profits having increased widely, but President D. W. Ambridge stated in his report that further rehabilitation of the company's properties will be necessary before the dividend policy on common shares can be established.

Net sales of Abitibi last year amounted to \$64,340,000, and after operating costs and general and administrative expenses the operating profit is given as \$24,620,000, more than \$4,000,000 higher than in the previous twelve months.

Dryden Paper Co. reports earnings of \$490,185 before depreciation, depletion and taxes. This compares with \$341,163 for the previous year, or an increase of approximately 43 percent.

Consolidated earnings statement of the E. B. Eddy Co. shows net profit of \$564,757. The operating profit of the operating subsidiary is shown at \$2,307,320, which would seem to compare with \$1,846,128 in 1946, although the 1946 statement was not drawn up in exactly comparable form. All production units were operated at the maximum attainable, according to President G. Gordon Gale.

Net earnings of Provincial Paper Co., after all charges, are nearly three times those of the previous year at \$1,055,511, and production was at all-time high record. The company commenced production of machine coated paper last year for the first time in Canada.

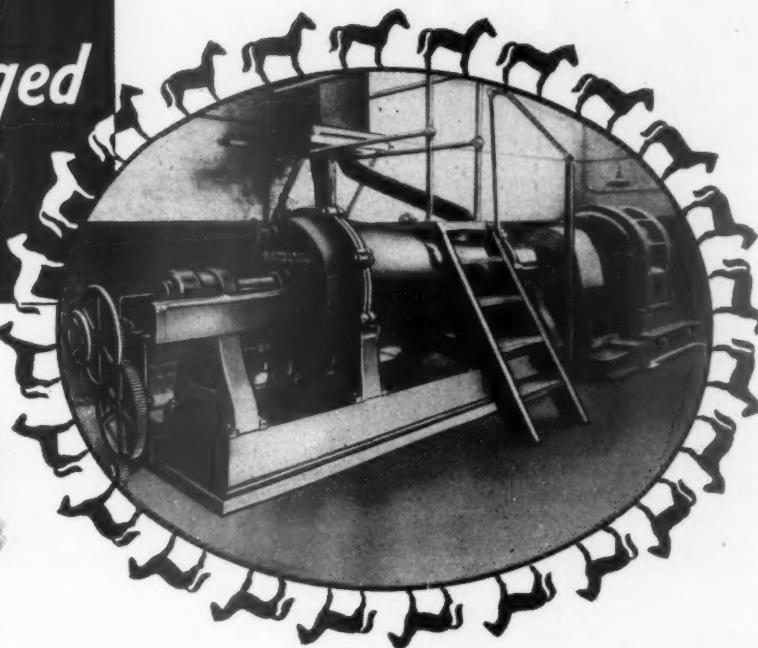
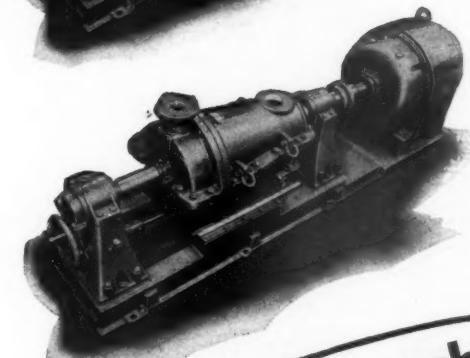
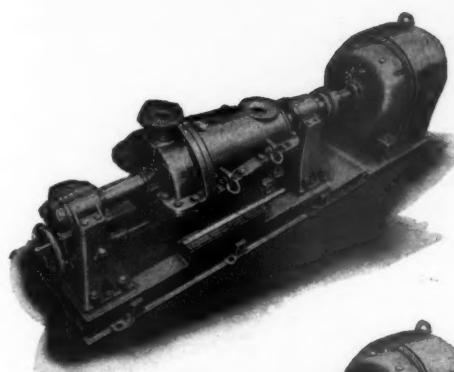
Operating profits of Price Bros. & Co. were up more than \$1,100,000, or about 8.5 percent, with net earnings after all charges and preferred dividends equal to \$10.80 a share on outstanding common stock, compared with \$8.32 a share earned in 1946. The operating profit was actually \$14,209,224, compared with \$13,098,658 a year ago. Net working capital increased during the year under review by about \$4,850,000 to \$16,816,672 as compared with \$11,956,522. Net profit was \$6,100,000.

On widely increased operating profits, Rolland Paper Co. shows net earnings, before write-off to special depreciation, more than double the figure for the preceding year. President J. Pierre Rolland reports a year of record production, with the outlook for the current year being a return to more competitive business.

Operating profit of \$1,023,909 for the past year compared with \$630,763 for 1946. Net earnings of \$320,734 compared with the previous year's figure of \$162,427.

Consolidated net earnings of Maclarens Power & Paper Co. were \$2,458,491, compared with \$1,807,257. Sales of newsprint, logs, etc., less shipping costs, amounted to \$8,546,583.

$2 \times 1 = \frac{3}{5} \text{ TH'S}$
*in a mill
 which changed
 from this →
 to this*



2 Jones High-Speed REFINERS

AT LEFT, 60 H.P. MOTORS, REPLACED
 A MUCH LARGER JORDAN (ABOVE)
 USING A 200 H.P. MOTOR, IN AN EAST-
 ERN MILL MAKING GLASSINE PAPER.

This change resulted in:

- A saving of 80 Horsepower.
- Improved sheet formation.
- Closer control of stock characteristics.
- Uniformity of stock treatment.
- Easier and less expensive maintenance.

**How much
 HORSEPOWER
 are your old
 Jordans wasting?**

Perhaps a similar change in your own
 mill would result in even greater ben-
 efits. Write us for a recommendation.

Jones

E. D. JONES & SONS COMPANY - PITTSFIELD, MASS.
 Builders of Quality Machinery for Paper Mills

MANUFACTURERS AND DISTRIBUTORS IN CANADA: WATEROUS LTD., BRANTFORD, ONT.



Less Than 1,000 Mills MAKE OVER 27,000,000 TONS

THE North American continent is making paper at a 50% greater rate than any year before World War II and before the early wartime restrictions which put the brakes on the upward climb for several years.

In 1947 this continent made a little more than 27,000,000 tons of paper of all kinds. This was, by a wide margin, the greatest production for any year and more than 2,000,000 tons or nearly 9% greater than in 1946. In 1946, in its turn, the less than 1,000 mills of North America had exceeded the 1945 record by more than 2,500,000 tons.

The American Pulp & Paper Association's statistical committee has predicted a 22,000,000-ton year for the U. S. industry alone in 1948 and 30,000,000 tons by 1955,

which will probably help to push the continental figures for those years up to over 28,000,000 and 36,000,000 or 37,000,000, respectively, for those years.

United States mills are currently making about 77% of all the paper made in North America. Canada contributes 21% and Newfoundland 1½%.

For the first time this year, PULP & PAPER has extended its "in-the-field" survey to Mexico and though that country's new kraft industries and extended papermaking facilities have tripled its paper output since 1937—in just ten years—it probably did not go over 140,000 tons in 1947. But it's shooting for 240,000.

APA statistics show paper swept the board with all new all-time records. Paper production was 21,040,000 tons in 1947

as compared with 19,278,000 tons in 1946. This was twice the production for any year prior to 1936 (except it was just almost twice 1929's) and this was three times the paper output in U. S. prior to 1925.

The industry is revealed by 1947 statistics as a leading factor in the foreign trade of the United States. Its imports hit an all-time high of 4,120,917 tons and exports also smashed all records with 474,149 tons. The importance of the industry in trade is really seen when imports of pulp and wood as well as newsprint and, to a lesser degree, other papers are lumped and show a total of \$675,000,000 of foreign exchange thereby created. All the U. S. paper industry's exports were valued at \$173,000,000 in 1947.

Consumption of paper in the United States likewise reached an all-time record of 24,686,000 tons, which is twice the amount of paper consumed in the early '30's and late '20's. Consumption of paper per person in the U. S. hit the record high of 343 pounds per person.

Following are figures showing how the total paper production of U. S., Canada and Newfoundland have increased in just the past decade:

Year	Tons
1947	27,070,000
1946	24,730,000
1945	21,965,000
1944	21,499,980
1943	21,252,032
1942	21,590,629
1941	22,637,141
1940	19,153,123
1939	17,410,144

New Uses for Paper

In last year's North American Review Number there was discussed the

UNITED STATES

Paper and Woodpulp Production and Consumption (latter for paper only—excluding rayon, plastics, etc.)
Consumption of Domestic and Imported Pulpwood and Total Pulpwood Consumption

Year—	PAPER		WOODPULP		CONSUMPTION OF PULPWOOD		
	Production (tons)	Consumption (tons)	Production (tons)	Consumption (for paper only) (tons)	Domestic (cords)	Imported (cords)	Total (cords)
1899	2,167,593	2,158,000	1,179,525	1,216,254	1,617,093	369,217	1,986,310
1904	3,106,696	3,049,824	1,921,768	2,091,006	2,477,099	573,618	3,050,717
1909	4,216,708	4,224,000	2,495,523	2,856,593	3,207,653	793,954	4,001,607
1914	5,270,047	5,496,164	2,893,150	3,556,377	3,641,063	829,700	4,470,763
1919	6,190,361	6,479,490	3,517,952	4,113,911	4,445,817	1,032,015	5,477,832
1920	7,334,614	7,846,827	3,821,704	4,696,035	5,014,513	1,099,559	6,114,072
1921	5,356,317	6,053,915	2,875,601	3,544,218	3,740,406	816,773	4,557,179
1923	8,029,482	9,339,573	3,788,672	5,149,695	4,636,789	1,236,081	5,872,870
1925	9,182,204	10,590,090	3,962,217	5,590,304	5,005,443	1,088,376	6,093,821
1927	10,002,070	11,915,233	4,313,403	5,960,865	5,526,889	1,224,046	6,750,935
1929	11,140,235	13,347,925	4,862,885	6,704,341	6,411,566	1,233,445	7,645,011
1931	9,381,840	11,403,850	4,409,344	6,005,718	5,896,446	826,320	6,722,766
1932	7,997,872	9,733,764	3,760,267	5,083,446	4,891,424	741,699	5,633,123
1934	9,186,266	11,185,682	4,436,128	5,969,633	5,822,681	973,978	6,796,659
1935	10,506,195	12,490,886	4,925,669	6,877,869	6,590,942	1,037,332	7,628,274
1936	11,670,000	14,546,046	5,695,219	7,420,829	7,506,156	1,209,760	8,715,916
1937	12,600,000	15,798,362	6,572,918	8,692,489	8,870,932	1,522,868	10,393,800
1938	11,327,000	13,488,300	5,933,560	7,975,000	7,900,053	1,293,938	9,193,991
1939	13,509,642	15,930,349	6,993,334	9,058,415	9,685,592	1,130,874	10,816,466
1940	14,483,709	16,620,632	8,959,559	9,781,739	12,564,180	1,435,820	14,000,000
1941	17,762,365	20,391,412	10,375,422	11,363,600	15,400,000	1,292,640†	16,692,640
1942	17,083,862	19,608,862	10,783,430	11,038,020	15,972,000	1,232,000	17,204,000
1943	17,035,688	19,560,688	9,680,462	10,635,320	15,000,000	1,718,000	16,718,000
1944	17,182,804	19,485,887	10,108,443	10,502,204	14,819,000	1,650,000	16,469,000
1945	17,370,963	19,665,487	10,167,200	10,825,412	15,315,000	1,699,000	17,014,000
1946	19,277,667	22,411,476	10,605,225	12,088,500	16,089,560	1,728,000	17,817,560
1947	21,039,190	24,685,958	11,951,548	13,325,974	17,735,000	2,000,000	19,735,000

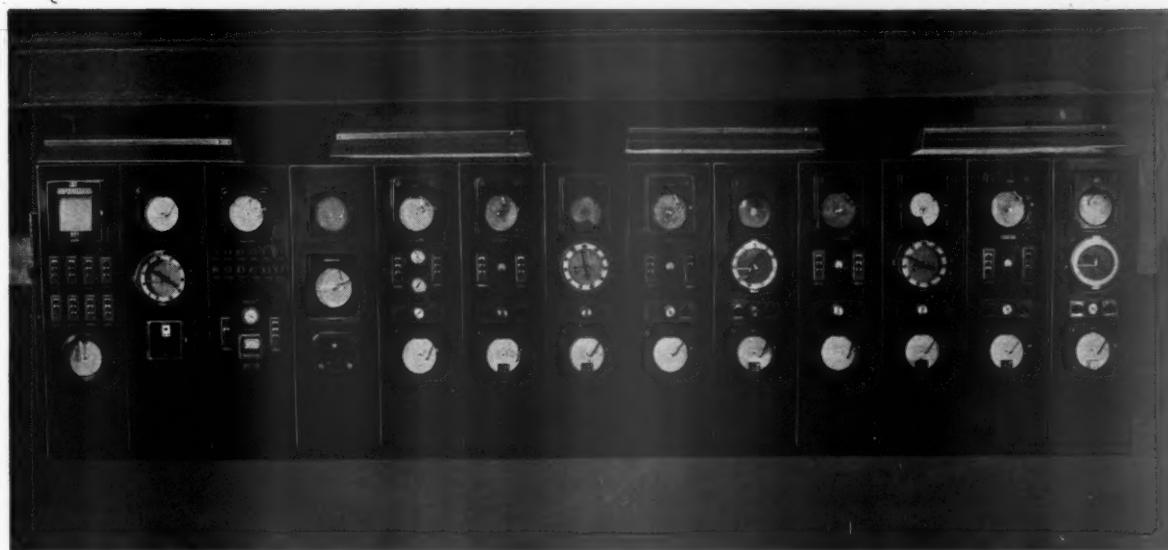
Source: Bureau of the Census, United States Forest Service and A. P. & P. A. Bureau Foreign and Domestic Commerce, U. S. Pulp Producers Association.

†Available for nine months of 1941 only. Other 1941 figures estimated for 12 months.

Note: Pulp consumption for all purposes—paper, rayon, plastics, etc.—was 13,872,222 tons in 1947, 12,563,000 tons in 1946, 11,362,600 tons in 1945 and 11,066,204 tons in 1944.

MASONEILAN DIGESTER CONTROLS

Give More Uniform Cooks, Increase Tonnage and Produce Higher Quality Pulp

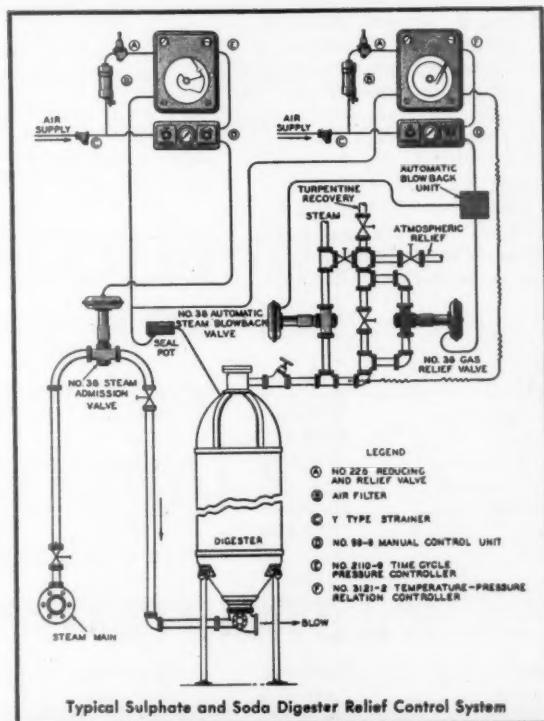


Masoneilan automatic digester controls produce better pulp faster and more economically. Their record of performance is proved in pulp mills throughout the United States and Canada.

Successive cooks are more uniform because each is carried out under identical, predetermined conditions. Cooking time is shortened thus speeding up production.

Check these outstanding Masoneilan advantages—more uniform pulp...lower percentage of rejections . . . uniformity from cook to cook . . . lower steam consumption . . . improved gas recovery . . . greater production . . . higher pulp strength . . . lower bleaching costs.

Investigate Masoneilan Digester Controls for your pulp mills.



Typical Sulphate and Soda Digester Relief Control System



MASON-NEILAN REGULATOR COMPANY
1209 ADAMS STREET, BOSTON 24, MASSACHUSETTS

New York—Buffalo—Chicago—St. Louis—Philadelphia—Houston—Pittsburgh—Cleveland—Tulsa—Atlanta—San Francisco
Cincinnati—Denver—Los Angeles—Mason Refrigerator Company of Canada, Ltd., Montreal and Toronto.

back-log of ideas for new uses of paper. That back-log still exists and almost in its entirety, for the majority of the new uses did not develop. The reason was in wood and pulp supply rather than in lack of demand for new paper products. Today the development of new uses for paper is confined largely by raw material availability.

Nevertheless, in 1947-48 many new ideas did appear. Perhaps the most dramatic—as well as perhaps most potentially profitable for the paper industry—was packaging. And, specifically, the “prepackaging” of fresh fruits, vegetables and meats. Almost all factors in the paper manufacturing industry are now taking a hand in this amazingly healthy baby of the produce field—makers of waxed papers, glassine, wet strength papers, board, laminates, and the kraft bag manufacturers. When prepackaging was first launched the manufacturers of transparent sheet appeared to be those who might profit most importantly from the development. “Visibility” was claimed to be the primary selling point in prepackaged foods. But while transparent sheet still leads over other wraps in this new field it has been quickly challenged, and with notable success, by opaque and semi-opaque papers—and even by combinations of kraft papers and transparent sheet. It has been found in prepack studies that complete visibility is not entirely necessary for many foods. In return for reduced visibility, many papers offer more space on which to print brand names—and dependable brand has been shown to be vital to the prepackaging industry.

They offer other advantages, in certain types of foods, and among these are added strength under shipping conditions, and also economy in packaging costs.

Notable in this field was the final development in April of a valve-type multi-wall bag for oranges and grapefruit by the St. Regis Paper Co. This is a kraft bag to carry grapefruit or oranges from grower points to retail outlets. The inner

lining of the bag is specially treated to withstand the acid condition of the fruit, and citrus growers see many advantages over the mesh bag which has been in use heretofore. To make this development possible St. Regis brought into the picture its own engineering and machine department to design and build equipment which would handle the fruit and feed it speedily into the new bag. Behind St. Regis in this development—and it is a big one in the citrus industry—was considerable experience in making bags for industry and agriculture. Last year their bag production was 190,508 tons. It is said that St. Regis’ experience in the citrus and other fields this year may lead to new consumer packages and not only in the fruit industry. But details on this are not ready for publication at this time.

Union Bag and Paper Co. was first to enter the prepackaging field with a consumer bag aimed directly at both hard and soft fruits. Their engineers developed ingenious combinations of kraft bag and mesh or transparent sheet “windows.” Known in the trade as window bags, the Union trade name is Union Pek (pronounced “peek”) Window Bags. There is a square bag for green beans, carrots, limas, peas, other soft lines. Another bag is for so-called “hard” fruits and vegetables. Both are wet strength treated.

Also notable in the prepackaging field was the development of a molded pulp product by B-F-D Division of Diamond Match Co. at their Plattsburg, New York, operations. This is a blood-resistant meat tray to be used in connection with transparent sheet for the prepackaging and self-service sale of fresh meats.

The frozen food situation has improved markedly since the slump and reorganization reported in the Review Number last year. As the *Wall Street Journal* has put it, a hard hit industry has been thawing out a big surplus. The industry feels much better, and some believe there will be an increase of as much as 15%. This would

mean a 1948 pack of 800 million pounds. Some optimists say it will go to the 973 million of 1946.

Not all of the new use developments, of course, were in the food field. Noteworthy was Kimberly-Clark’s market test on a Cellophane-wrapped package of twenty-four facial tissues—a handbag-size package opened by a cellulose acetate strip in the same way as a cigarette package except that a slit is left through which the Kleenex is drawn as in the larger packages.

The list of new uses, even despite the shortage of pulp, would be sizable and impressive. But the variety is illustrated by a pastry decal. This is a hard jelly design between two sheets of paper, the design transferred onto cake frosting by wetting the paper and lifting it off the cake. It is an excellent, though curious, example of new uses for paper developed by a new idea—and you may be sure that other new uses are developing at this moment in thousands of brains all over the U. S.

There were, as always, instances of paper losing important market grounds. This is something not closely enough watched in an industry as large as pulp and paper. Interesting examples: the adoption by Gillette of a plastic case for razor blade packaging; and the development of plastic-and-cotton curtains, unwoven and washable, to complete with paper curtains on a far more advantageous basis.

International Situation and Paper

Over any discussion of paper use futures these days hang the clouds of war. It is known that ERP does not contemplate the shipment of paper to Europe but rather of the equipment with which to make paper. But war would mean that deuces were wild again, and that new uses would be either for destruction or for the making of “copies in 45 triplicates.” There seems no question but that another war, so close after the last, would mean the

(Continued on Page 92)

TOTAL PAPER PRODUCTION IN UNITED STATES (Tons of 2,000 lbs.)

	1940	1942	1943	1944	1945	1946	1947
Newsprint	1,056,304	967,211	811,309	720,752	725,475	772,797	816,151
Book	1,655,423	1,704,029	1,592,878	1,435,785	6,501,015	1,933,428	2,189,890
Groundwood	550,453	610,168	585,673	593,094	636,026	775,779	829,952
Fine	735,753	1,055,475	1,020,601	974,372	1,000,794	1,160,411	1,229,443
Wrapping (Coarse)	2,500,818	2,713,738	2,501,637	2,559,447	2,403,182	2,690,490	2,906,059
Tissue	733,894	170,653	162,766	157,540	157,083	183,837	204,092
Sanitary		811,343	806,023	807,893	823,705	860,658	868,630
Absorbent	129,410	64,530	88,254	90,107	88,643	102,811	102,365
Building Papers	682,460	1,001,383	877,582	881,246	883,259	1,035,639	1,206,921
Other Paper	60,120	16,148	129	—	238,047	271,643	280,978
Container Board	3,434,834	3,755,438	4,087,972	4,228,304	4,131,107	4,314,938	4,799,284
Folding Boxboard	1,416,452	1,711,795	2,015,640	2,116,152	2,092,344	2,317,496	2,199,336
Setup Boxboard	898,549	996,688	829,102	750,313	721,087	520,772	585,555
Tube Stock		164,785	307,308	458,107	—	—	—
Building Boards	179,443	1,052,054	1,063,851	1,087,467	894,830	956,358	1,214,350
Other Boards	449,796	288,424	284,963	322,225	1,074,368	1,380,610	1,595,892
TOTAL	14,483,709	17,083,862	17,035,688	17,182,804	17,370,965	19,277,667	21,028,898

Source: Bureau of Census, U. S. Department of Commerce.

NOTE—THESE ARE PRELIMINARY FIGURES ON PAPER PRODUCTION IN THE U. S. FOR 1947, AS RECEIVED FROM THE U. S. BUREAU OF CENSUS, AND THEY ARE USED HERE TO

CORRESPOND WITH THE BREAKDOWN OF GRADES IN THIS TABLE. THEY ARE SLIGHTLY DIFFERENT THAN THE LATER FIGURES IN OTHER TABLES IN THIS SECTION.



PACIFIC COAST REPRESENTATIVES
OF THE FOREMOST NATIONAL
MANUFACTURERS OF

**MACHINE CLOTHING
SUPPLIES
EQUIPMENT
RAW MATERIALS
for
PULP AND PAPER MILLS**

1116 PUBLIC SERVICE BLDG., PORTLAND, OREGON
343 SANSOME ST., SAN FRANCISCO, CALIFORNIA

True conservation of our forests
proper growth, proper use. A good



This is your Grandson's Forest

It's not primeval. Such a forest is as carefully tended as a well run business—which it actually *is*. Or a well run home—which it is, too. The creatures who live in it will be part of the woodland's fascination for your grandson, when he and his friends camp and hike and fish there. But Nature, though lavish is destructive—unchecked. It takes planning and managing to make sure our forests are dedicated to the greatest good of the greatest number of people.

St. Regis, with over 1,800,000 acres of timberland, has an ever growing sense of stewardship—as if these living things were lent, not owned. Our goal is intelligent *use* of our forests—growing and cutting and growing again—for that ideal yet attainable balance of *sustained yield*.

So, for generations to come, millions of people the country over may have better, fuller lives, through the use of paper and paper products made from trees. And at the same time may have the wonder and the beauty and the riches of the woods themselves.

ST. REGIS PAPER
Company

230 PARK AVENUE, NEW YORK 17, N. Y.

Quick Facts ABOUT ST. REGIS					
 1,800,000 ACRES OF TIMBERLAND	 MILLS & PLANTS IN 30 LOCATIONS	 ASSETS OVER 130 MILLION DOLLARS	 13,115 EMPLOYEES	 OVER 15,000 STOCKHOLDERS	
PRINTING PUBLICATION AND CONVERTING PAPERS	Magazines—Mail Order Catalogs—Telephone directories—Books Coated and uncoated for offset, letterpress, roto. Specialty and Converting papers	PAPER FOR MULTIWALL BAGS	PAPER FOR PANELYTE	Cement, Fertilizer, Limestone, Chemicals, Feed, Flour, Sugar, Potatoes, and more than 400 other products.	The structural, laminated plastic for Refrigeration, Electrical, and Radio Industries. Decorative Panels for table tops and furniture.

United States Paper Production, Imports, Exports, and Consumption

(Quantities in Tons of 2,000 Pounds)

Year—	Production	Imports	Exports	Consumption Tons Lbs., Capita	Year—	Production	Imports	Exports	Consumption Tons Lbs., Capita
Newsprint									
1899	569,212			569,212 15.2	1934	989,705	2,209,698	23,405	3,175,998 50.2
1904	912,822		52,159	860,663 20.8	1939	954,259	2,615,129	13,495	3,555,893 54.2
1909	1,168,098		48,740	1,119,358 24.7	1941	1,043,999	2,982,375	70,265	3,956,109 59.9
1914	1,313,284	278,403	44,483	1,547,204 31.6	1943	811,309	2,637,429	35,256	3,413,482 50.3
1919	1,323,880	627,734	110,268	1,841,346 35.1	1945	725,475	2,668,799	43,611	3,350,623 48.0
1924	1,481,425	1,357,233	17,159	2,821,499 49.8	1946	772,797	3,490,280	27,685	4,235,392 60.0
1929	1,409,169	2,422,700	18,695	3,813,174 62.8	1947	817,391	3,957,327	27,891	4,746,827 65.9

Beginning with 1941, text papers allocated to fine papers.

Year—	Production	Imports	Exports	Consumption Tons Lbs., Capita	Year—	Production	Imports	Exports	Consumption Tons Lbs., Capita
1899	304,459			304,459 8.1	1934	1,055,247	4,730	12,066	1,047,911 16.6
1904	454,337			454,337 11.0	1939	1,546,930	13,749	22,463	1,538,216 23.4
1909	582,114	1,104		583,218 12.9	1941	2,025,891	28,506	51,752	2,002,645 30.4
1914	795,958	6,489	14,301	788,146 16.1	1943	1,592,878	28,000	31,566	1,589,312 23.4
1919	828,641	146	76,691	752,096 14.3	1945	1,501,015	29,689	62,455	1,468,249 21.0
1924	1,050,000	14,328	10,970	1,053,358 18.6	1946	1,933,428	81,050	59,845	1,954,633 27.7
1929	1,497,912	3,406	27,567	1,473,751 23.9	1947	2,198,123	74,432	76,380	2,196,175 30.5

From 1899 to 1940 inclusive, only writing and cover were included in fine papers. Beginning with 1941, text papers (from book), bristol (from paperboard), and "thin papers" (from tissue) have been added.

Year—	Production	Imports	Exports	Consumption Tons Lbs., Capita	Year—	Production	Imports	Exports	Consumption Tons Lbs., Capita
1899	131,456			131,456 3.5	1934	434,870	879	10,263	425,486 6.7
1904	168,982			168,982 4.1	1939	613,995	573	20,498	594,070 9.0
1909	215,791			215,791 4.7	1941	950,014	2,750	46,783	903,390 13.7
1914	269,407			266,038 5.4	1943	1,020,061	663	58,525	962,376 14.4
1919	347,346			37,680 5.9	1945	1,000,794	589	86,598	914,785 13.1
1924	422,000	1,373	4,040	419,333 7.4	1946	1,160,411	477	82,682	1,078,206 15.3
1929	635,662	1,613	16,660	620,615 10.2	1946	1,232,670	728	69,954	1,163,444 16.2

Beginning with 1941, text papers allocated to fine papers.

Year—	Production	Imports	Exports	Consumption Tons Lbs., Capita	Year—	Production	Imports	Exports	Consumption Tons Lbs., Capita
1899	535,252			535,252 14.3	1934	1,356,115	5,124	32,160	1,329,079 21.0
1904	644,291			644,291 15.6	1939	2,238,993	14,954	41,014	2,212,933 33.8
1909	763,067			763,067 16.8	1941	2,262,377	1,009	49,675	2,213,711 32.4
1914	911,029	18,258	7,067	922,220 18.8	1943	2,314,031	2,133	43,956	2,272,208 32.9
1919	858,464	2,401	49,408	811,457 15.5	1945	2,403,182	802	51,690	2,352,294 33.7
1924	1,235,000	25,540	18,520	1,242,020 21.9	1946	2,690,490	7,072	50,086	2,647,476 37.5
1929	1,605,783	9,344	29,425	1,585,702 26.1	1947	2,900,956	22,175	51,026	2,872,105 39.9

Year—	Production	Imports	Exports	Consumption Tons Lbs., Capita	Year—	Production	Imports	Exports	Consumption Tons Lbs., Capita
1899	28,406			28,406 0.7	1934	397,196	8,687	7,281	398,602 6.3
1904	43,925			43,925 1.1	1939	665,723	9,347	14,695	660,375 10.1
1909	77,745			77,745 1.7	1941	912,874	76	26,500	889,035 13.5
1914	115,401			115,401 2.4	1943	968,789	131	23,210	948,479 14.0
1919	190,561	245		190,806 3.6	1945	980,788	105	18,127	962,766 13.8
1924	242,000	6,795	4,368	244,427 4.3	1946	1,021,545	114	17,093	1,004,566 14.3
1929	387,811	10,527	7,725	390,613 6.4	1947	1,074,966	923	18,154	1,057,735 14.7

Beginning with 1941, "Thin Papers" have been allocated to fine papers.

Year—	Production	Imports	Exports	Consumption Tons Lbs., Capita	Year—	Production	Imports	Exports	Consumption Tons Lbs., Capita
1899	394,111			394,111 10.5	1934	4,073,261	20,936	51,159	4,043,038 63.9
1904	559,711			559,711 13.6	1939	6,104,968	28,610	103,384	6,030,194 92.1
1909	883,088			883,088 19.5	1941	8,399,960	36,882	141,250	8,293,592 125.7
1914	1,291,805			1,291,805 26.4	1943	8,620,434	54,234	89,705	8,566,729 126.4
1919	1,867,064	44,461	61,890	1,849,635 35.2	1945	8,913,736	51,189	155,020	8,809,905 126.2
1924	2,850,000	55,275	48,661	2,856,614 25.5	1946	9,504,235	42,347	109,158	9,437,424 133.6
1929	4,451,187	42,351	94,374	4,399,164 72.4	1947	10,394,796	60,109	176,502	10,278,403 142.8

*Includes groundwood, absorbent, building papers and "All Other," and Industrial Papers from 1943.

Source: American Paper and Pulp Assn.

eventual crippling of the industry. It would prevent maintenance of equipment at a time when it is sorely needed, and it would seriously deplete the physical attributes of existing equipment much of which is already in need of replacement. The industry would stagger overloaded to the end of another war, many of its plants in bad shape, and possibly with "new uses" very much out of demand

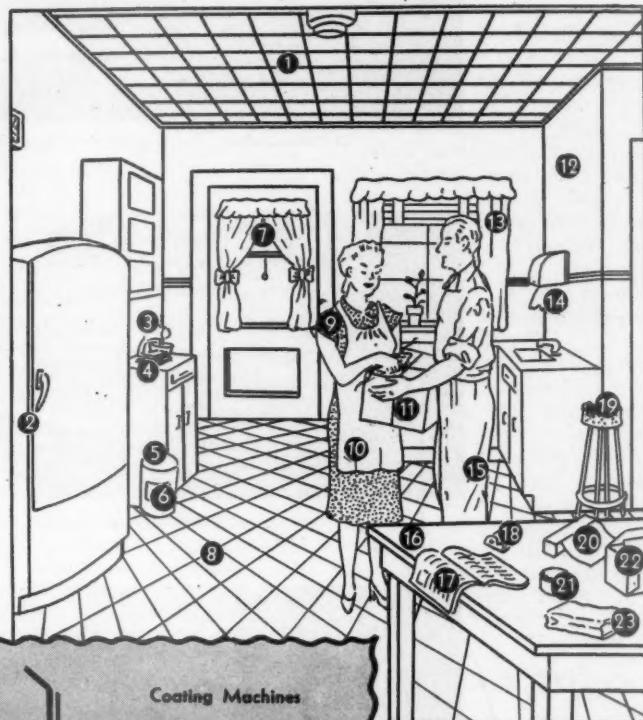
due to the battered U. S. economy. Yet as this issue went to press, war had to be considered as a possibility and the industry was organizing on paper for a WPB organization similar to that in World War II. The thing to remember is that—now—the remaining consumer goods shortage, and there is still some shortage, has prevented certain progress in the use of paper. Heavy exports and heavy taxes

for defense or war may hamper the market for luxury items which call for paper wrapping, and two wars in quick succession would be likely to lower paper consumption later on, rather than increase it.

During latter 1947 and so far this year newspaper publishers have not been any happier about the newsprint situation. They have been clamoring at Congress for newsprint mills in Alaska—although

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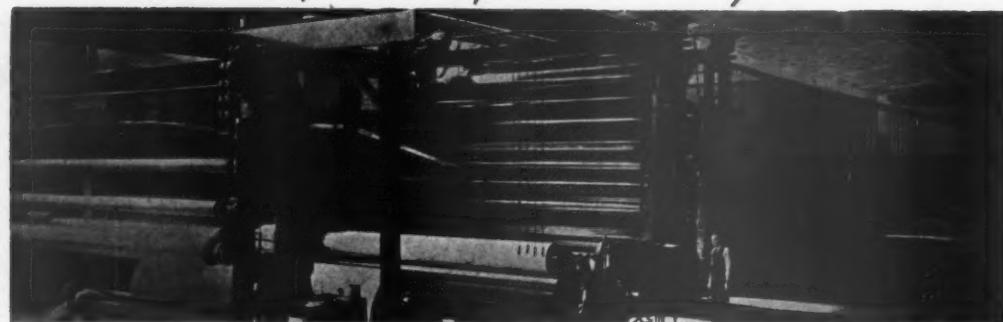
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5. Fibre Board	17. Coated Paper
6. Labels	18. Sealing Tape
7. Shade Cloth	19. Artificial Leather
8. Floor Covering	20. Waxed Paper
9. Printed Cloth	21. Closures
10. Rubberized Fabric	22. Cartons
11. Decorative Paper	23. Bag Linings
12. Plywood	

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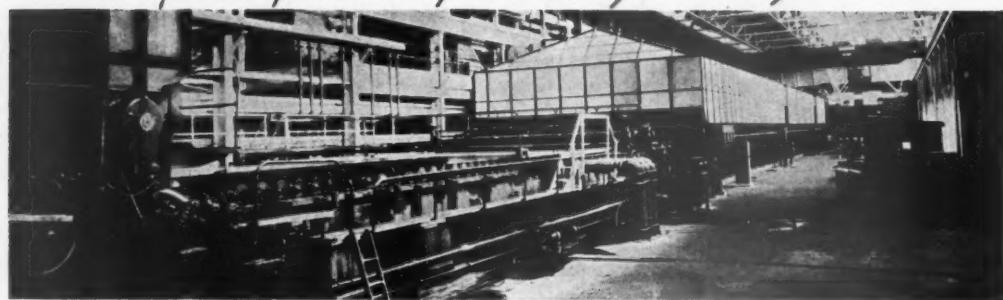
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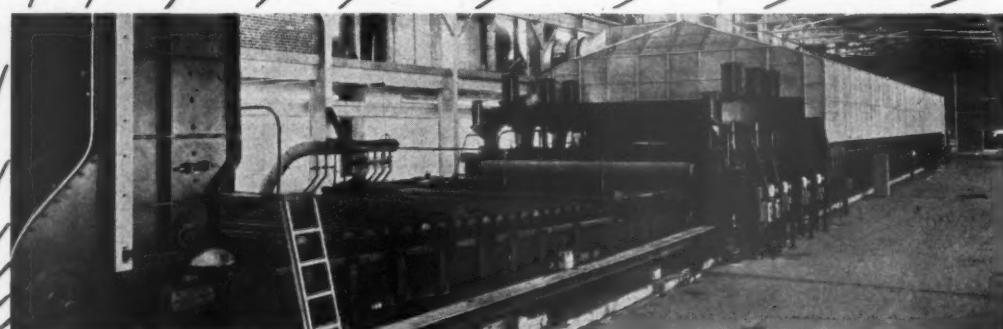
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under present conditions and costs only unbleached pulp operations seem practical for that territory.

There is still not much change in the newsprint picture from last year. Advertising lineage is still up, and the newsprint supply remains short. There is still a fantastic economy pattern in the newsprint field. Example: a Genoa mill makes purchases of pulp from the west coast, sells Italian-made newsprint to an Oregon newspaper at \$240 per ton—and it is F.O.B. Genoa dock! Big "grey market" prices are reported here and there when a newspaper is in distress. But there has been little cutting of newspaper pages anywhere. It appears that newsprint is found, when needed badly, at some kind of a price.

Book sales have slipped somewhat, in some areas rather badly. But the number of titles issued continues almost the same as 1947. The actual sales would still constitute a boom period for book publishers when compared with pre-war years. But cost are ever mounting and publishers are gloomy about the future on this score. A novel at \$3.50 was not the easy answer, and most novels are now pegged at \$3.00, which makes a very narrow margin for the publisher—and a loss if the book goes less than 10,000 copies. These reasons are behind the slight building up of inventories in book papers and particularly offset.

Number of book titles is running almost 500 ahead of the same period in 1947, but the Typographical Union of New York seemed determined to cut this down in

PER CAPITA CONSUMPTION OF PAPER AND PAPERBOARD IN MEXICO

(Imports Plus Production)

Year	Population	Per Capita Consumption
1937	18,736,786	13.5 lbs.
1942	20,656,807	17.8 lbs.
1946	22,695,912	18.5 lbs.

The increase of five pounds during the ten-year period, 1937-46, is more significant because there are millions of natives who do not consume paper of any kind. Per capita consumption is definitely on the upward trend, due, in part, to the industrialization and educational program.

a bid for a 25 percent increase in wages for book composition. In early April they were out on strike.

Trends observable last year in the magazine field appear to be continuing. They are: incomes well above pre-war levels, increasing use of color, increased circulation among the big ones. Here again the bugaboo is costs, and advertising rates cannot go much higher, say informed quarters. There are few if any plans for important new magazines. Significant is Henry Luce's announcement that his new literary magazine has been "temporarily suspended." Collier's magazine "X" has not appeared after a threat now more than a year old. Increasing costs have frightened venture capital out.

Paper Imports Increase

Another new postwar factor to be considered in a discussion of paper has been the steady increase in imports. There seems little question in the mind of such an expert as Warren B. Bullock, Import

Committee of AP&PA, that "foreign producers are getting a definite hold in the U. S. market and may be difficult to dislodge." The imports of dutiable paper rose to \$18,000,000 in 1947 as compared with \$11,000,000 in 1946. Imports of kraft doubled in 1947 over the previous year, and other grades have shown significant rises. Some wrapping paper imports in 1947 were invoiced here at prices hardly above that of the pulp. The changed financial structures of Europe, Canada, and Australia have added to the advantage in this market. Radical changes in American tariff law are now up for consideration and will be watched sharply by the industry.

The industry is a stronger one than ever—the capital investment per worker is now \$18,500, leading all other industries in amount of capital invested per worker. And it would seem, as Reuben B. Robertson, president of Champion Paper & Fibre Co., says, that the public is still ready to buy and that "we have nothing to fear from expanded capacity beyond a return to active salesmanship."

As this North American Review Number goes to press there are some rather definite signs that, while supply has not entirely reached demand, the time has come again when the salesman will be king. Early in April it was plain that some inventories were building up and that paper buyers were getting just a little fussy about quality again. In some lines there appeared to be what might be called a minor buyers' strike. Board prices were still sliding a little. Offset paper was

UNITED STATES PAPER PRODUCTION, IMPORTS, EXPORTS, AND CONSUMPTION

(Quantities in Tons of 2,000 Pounds)

TOTAL — ALL GRADES

Year	Production	Imports	Exports	Consumption	
				Tons	Lbs. Capita
1899	2,167,593	—	—	2,167,593	57.9
1904	3,106,696	—	77,704	3,028,992	73.3
1909	4,121,495	55,962	74,764	4,102,693	90.5
1914	5,152,705	349,278	106,713	5,395,270	110.2
1919	5,966,076	707,548	420,540	6,253,084	119.1
1924	7,929,985	1,500,433	149,541	9,280,877	164.0
1925	9,001,742	1,567,121	152,351	10,416,512	181.4
1926	9,794,086	1,973,451	183,130	11,584,407	198.8
1927	10,002,070	2,107,344	184,226	11,925,188	201.8
1928	10,403,338	2,266,828	218,730	12,451,436	207.8
1929	11,140,235	2,533,603	262,383	13,411,455	220.7
1930	10,169,140	2,365,272	215,811	12,318,601	200.7
1931	9,381,840	2,136,079	170,891	11,347,028	182.8
1932	7,997,872	1,848,016	119,292	9,726,596	155.6
1933	9,190,017	1,852,420	126,854	10,915,583	173.6
1934	9,186,598	2,265,281	163,199	11,288,680	178.3
1935	10,479,095	2,456,998	178,370	12,757,723	200.1
1936	11,975,552	2,855,153	179,727	14,650,978	228.1
1937	12,837,003	3,435,222	232,361	16,039,864	248.2
1938	11,380,814	2,357,477	208,064	13,530,227	207.8
1939	13,509,642	2,702,952	266,070	15,946,515	243.4
1940	14,483,709	2,826,880	578,248	16,732,341	254.2
1941	17,762,365	3,120,213	494,911	20,387,667	308.9
1942	17,083,862	3,046,207	390,837	19,739,132	296.8
1943	17,035,688	2,762,429	347,864	19,450,253	286.8
1944	17,182,804	2,616,000	312,917	19,485,887	286.6
1945	17,370,965	2,753,211	458,689	19,665,487	281.7
1946	19,277,667	3,625,422	393,301	22,509,788	318.8
1947	21,039,190	4,120,917	474,149	24,685,958	342.9

Source: American Paper & Pulp Assn.

On the Nail Head!

Last year it was estimated by PULP & PAPER, as a result of field staff research, that Canadian paper production in 1946 totalled 5,300,000 tons (see 1947 North American Review Number, page 70). The Canadian Dominion Bureau of Statistics did not release the Canadian official figures for 1946 until late last year. These showed production as totalling 5,347,118 tons. Thus, PULP & PAPER was only off by less than one per cent.

This year, the only estimate on Canada's total paper production for 1947 published in any reference book is the figure carried on this page—5,650,000 tons—arrived at by careful field survey.

going into the class where it had to be sold, and coated book buyer reactions was fair to middling. This inventory attitude was reflected in the attitude of pulp purchasers who were hanging slightly tough on, at least, commitments for the second quarter.

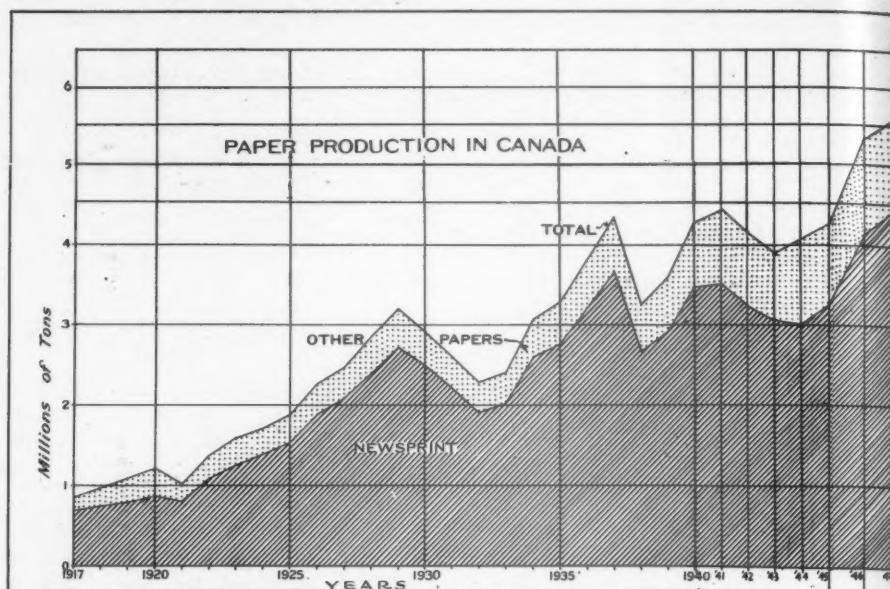
But one thing still was sure. The years 1947-48 were setting marks that might stand for a long time and yet leave the industry in excellent shape.

The consensus of paper manufacturers and distributors apparently is that demand continues consistent with no indications of subsiding. Some industry observers feel that there is evidence of a gradual betterment in the supply-demand situation as the result of the long up-trend in production while others believe that the gap between supply and demand is not decreasing. Variations occur in these observations in different sections of the country as well as by specific grades of paper or converted items. For the most part, however, there is the feeling, that, with additional new capacities coming into production, the over-all situation will ease materially for most grades and items by the middle of 1948, according to the Department of Commerce.

In reviewing the record accomplishments of the paper industry this past year, the Monthly Statistical Summary of the American Paper and Pulp Association, highlights the facts that during 1947 monthly production was exceeded six times.

Report on Japan's Pulp and Paper Production

Pulp production in Japan amounted to 255,366 short tons during the first 10 months of 1947, compared with 183,344 tons in the cor-



CANADIAN PAPER PRODUCTION figures for latest available years, officially, were: Total paper—5,347,118 tons in 1946; 4,359,576 tons in 1945; 4,044,376 in 1944; 3,882,262 tons in 1943; 4,164,565 in 1942, and 4,449,598 in 1941. Total newsprint—4,447,000 in 1947; 4,162,158 tons in 1946; 3,324,039 in 1945; 3,039,783 in 1944. PULP & PAPER estimate for 1947 showed total production increased to about 5,650,000 tons.

CANADIAN PAPER PRODUCTION (Selected Years)

	Newsprint		Total Paper	
	Tons	\$ Value	Tons	\$ Value
1917	689,847	38,868,084	853,689	58,750,341
1922	1,081,364	75,971,327	1,366,815	106,260,078
1929	2,725,331	150,800,157	3,197,149	192,989,252
1932	1,919,205	85,539,852	2,299,767	114,115,570
1939	2,926,597	120,858,583	3,600,502	170,776,062
1940	3,503,801	158,447,311*	4,319,414	225,836,809
1941	3,519,733	158,925,310	4,524,776	241,450,292
1942	3,257,180	147,074,109	4,231,767	230,269,512
1943	3,046,442	154,290,163	3,966,344	235,362,958
1944	3,039,783	165,655,165	4,044,376	255,545,841
1945	3,324,039	189,023,736	4,359,576	282,837,614
1946	4,162,158	280,809,610	5,347,118	396,956,390
1947	4,447,000*		5,650,000**	

*Estimated by Newsprint Association of Canada.

**Estimated by PULP & PAPER.

responding period of the preceding year, according to a report from SCAP. The output was 31,035 tons in October 1947, compared with monthly averages of 18,781 tons in 1946, 70,391 tons in 1941 (a peak year), and 44,097 tons in 1938.

Paper production increased to 260,287 tons in the first 10 months of 1947 from 191,351 tons in the corresponding period of 1946. The October 1947 production was 29,273 tons, compared with monthly averages of 19,380 tons in 1946, 119,346 tons in 1940 and 101,130 tons in 1938.

Pulpwood deliveries to Japanese pulp and

paper mills amounted to 3,597,562 koku (1 koku = 9,827 cubic feet) during the first 11 months of 1947, according to the Japanese Pulpwood Association. Deliveries in Nov. 1947 were 11 per cent higher than in Nov. 1946.

Cushioned Containers in Rolls

A new type of packaging medium, which is reported to cut shipping costs, has been announced by Sherman Paper Products Corp., Newton Upper Falls, Mass. Marketed under the name of Corroflex Tube-Tainer, it is described by the manufacturer as "cushioned containers in continuous rolls."

Corroflex was originally developed during the war as a sleeve used in packing palletized shipments of artillery shells.

The Tube-Tainer is supplied in stock rolls 250 feet long, in a variety of widths, the maker adds. "To use it, the packer simply cuts or tears off the correct length from a roll mounted at his bench, inserts the product and closes the ends."

CANADIAN PAPER PRODUCTION BY PROVINCES

(Quantity in Tons—Value in Dollars)

Years	Quebec	Ontario	British Columbia	Other Provinces	TOTAL
1945 Tons	2,292,442	1,267,796	334,502	464,836	4,359,576
1945 Value	\$148,180,691	\$86,395,223	\$20,353,984	\$27,907,716	\$282,837,614
1946 Tons*	2,667,594	1,579,537	370,950	529,037	5,347,118
1946 Value*	\$213,045,633	\$120,929,769	\$26,733,893	\$36,247,095	\$396,956,390

*Latest figures available.

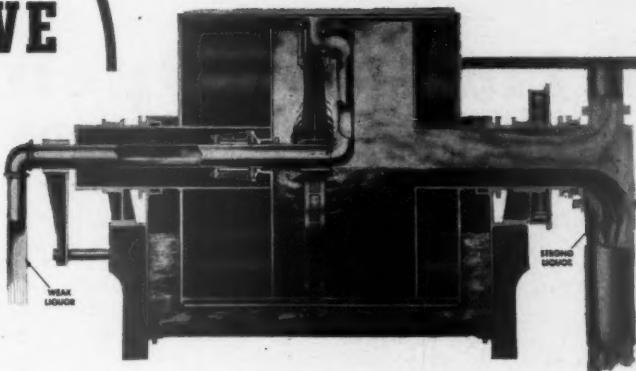
(Statistics on U. S. Production of Paper by States will not be available until later this year, according to U. S. Dept. of Commerce.)

BRITISH COLUMBIA PULP AND PAPER AND ALL FOREST PRODUCTS ESTIMATED VALUE OF PRODUCTION

	1940	1941	1942	1943	1944	1945	1946	10 Yr. Avg.
Pulp and Paper	\$22,971,000	\$27,723,000	\$27,457,000	\$25,597,000	\$30,391,000	\$33,782,000	\$41,800,555	1937-46
All Forest Products	102,804,000	119,920,000	124,720,000	146,611,000	147,655,000	173,471,370	173,471,370	\$25,419,256

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New Markets Open Up FOR ALL TYPES OF BOARDS

THE production of fiberboard and paperboard of all kinds, made from wood pulp or waste fibrous materials, reached new peak records in 1947 and the outlook is bright for all of these products.

Timber owners in all parts of North America are interested in ways and means of making more complete use of

their wood and fiberboard and paperboard are now offering an economically lucrative market for the conversion of all kinds of wood that formerly were the "left-overs" in sawmills and in the woods. Mill ends, sawdust, treetops, broken wood left in the forest—all this material can be converted into such products through the development of new processes and new

types of defibrating, pulping and refining equipment.

Meanwhile the consumption of waste paper, which goes largely into paperboard, rose to record heights — from 7,278,000 tons in 1946 to 7,845,000 tons in 1947.

Record in Paperboard

In this section is published the U. S. Paperboard Mill Census as released by the National Paperboard Association and a chart which is based upon association data over a long period of years and is annually a feature of the Review Number. Based on reports from NPA member mills, it shows a total of 4,901,700 tons of container board and 4,415,100 tons of boxboard produced in 1947, both figures being substantially higher than any ever before recorded in those categories. Thus many observers have been surprised that, instead of a drop-off in production of these types of board when military requirements relaxed, there is recorded a greater production than ever before.

The NPA figures show that in most categories of paperboard, production is just about double what it was in 1938. There have been some minor ups and downs in different grades of paperboard since then, but the general trend has been steadily upward.

The kraft paper grades have increased

PAPERBOARD HILL CENSUS
TONS
CONTAINER BOARDS

GRADES	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947
LINERS										
Jute	674,900	794,300	796,400	1,074,300	820,800	1,088,000	1,164,600	1,185,700	1,265,400	1,353,200
Kraft Cylinder	238,900	279,800	246,200	285,300	276,700	152,200	93,200	97,100	144,500	201,700
Kraft Fourdrinier	638,200	803,800	923,300	1,201,300	1,174,700	1,252,900	1,340,400	1,308,000	1,311,900	1,596,100
Total Kraft	877,100	1,083,600	1,169,500	1,486,600	1,451,400	1,405,100	1,433,600	1,405,100	1,456,400	1,797,800
TOTAL LINERS	1,552,000	1,877,900	1,965,900	2,560,900	2,272,200	2,493,100	2,598,200	2,590,800	2,721,800	3,151,000

CORRUGATING MATERIALS										
Straw, Bogus, Etc.	461,400	574,900	611,400	806,400	662,800	872,100	969,500	956,900	1,088,700	1,282,000
Kraft	212,100	263,000	292,000	326,200	269,300	157,600	120,400	154,600	174,400	138,300
TOTAL CORR. MATERIALS	673,500	837,900	903,400	1,132,600	932,100	1,029,700	1,089,900	1,111,500	1,263,100	1,420,300

CHIP										
Corrugating	76,500	75,900	75,500	77,900	72,200	83,800	96,800	83,000	114,200	81,600
Solid Fibre	177,800	208,600	202,800	273,000	330,800	332,700	338,200	314,500	214,600	248,800
TOTAL CHIP	254,300	284,500	278,300	350,900	403,000	416,500	435,000	397,500	328,800	330,400
TOTAL	2,479,800	3,000,300	3,147,600	4,044,400	3,607,300	3,939,300	4,123,100	4,099,800	4,313,700	4,901,700

BOXBOARDS										
Folding Box	1,162,400	1,385,100	1,413,100	1,749,300	1,560,500	1,737,700	1,785,400	1,872,000	2,286,400	2,237,900
Set-Up Box	518,800	585,700	613,200	731,500	615,900	599,000	543,100	511,600	474,100	601,500
Total	1,681,200	1,970,800	2,026,300	2,480,800	2,176,400	2,336,700	2,328,500	2,383,600	2,760,500	2,839,400
Other	777,500	976,400	1,144,200	1,365,800	1,363,000	1,361,000	1,484,300	1,408,400	1,388,000	1,575,700
TOTAL	2,458,700	2,947,200	3,170,500	3,846,600	3,539,400	3,697,700	3,812,800	3,792,000	4,148,500	4,415,100

SUMMARY

JUTE, Liner, Corr., Chip Boxboard, Etc.	3,776,800	4,474,000	4,632,900	5,903,400	5,220,400	5,857,700	6,117,600	6,081,300	6,586,400	7,067,100
KRAFT, Liner, Corr. Etc.	1,161,700	1,473,500	1,685,200	1,987,600	1,926,300	1,779,300	1,818,300	1,810,500	1,875,800	2,249,700
TOTAL ALL GRADES	4,938,500	5,947,500	6,318,100	7,891,000	7,146,700	7,637,000	7,935,900	7,891,800	8,462,200	9,316,800

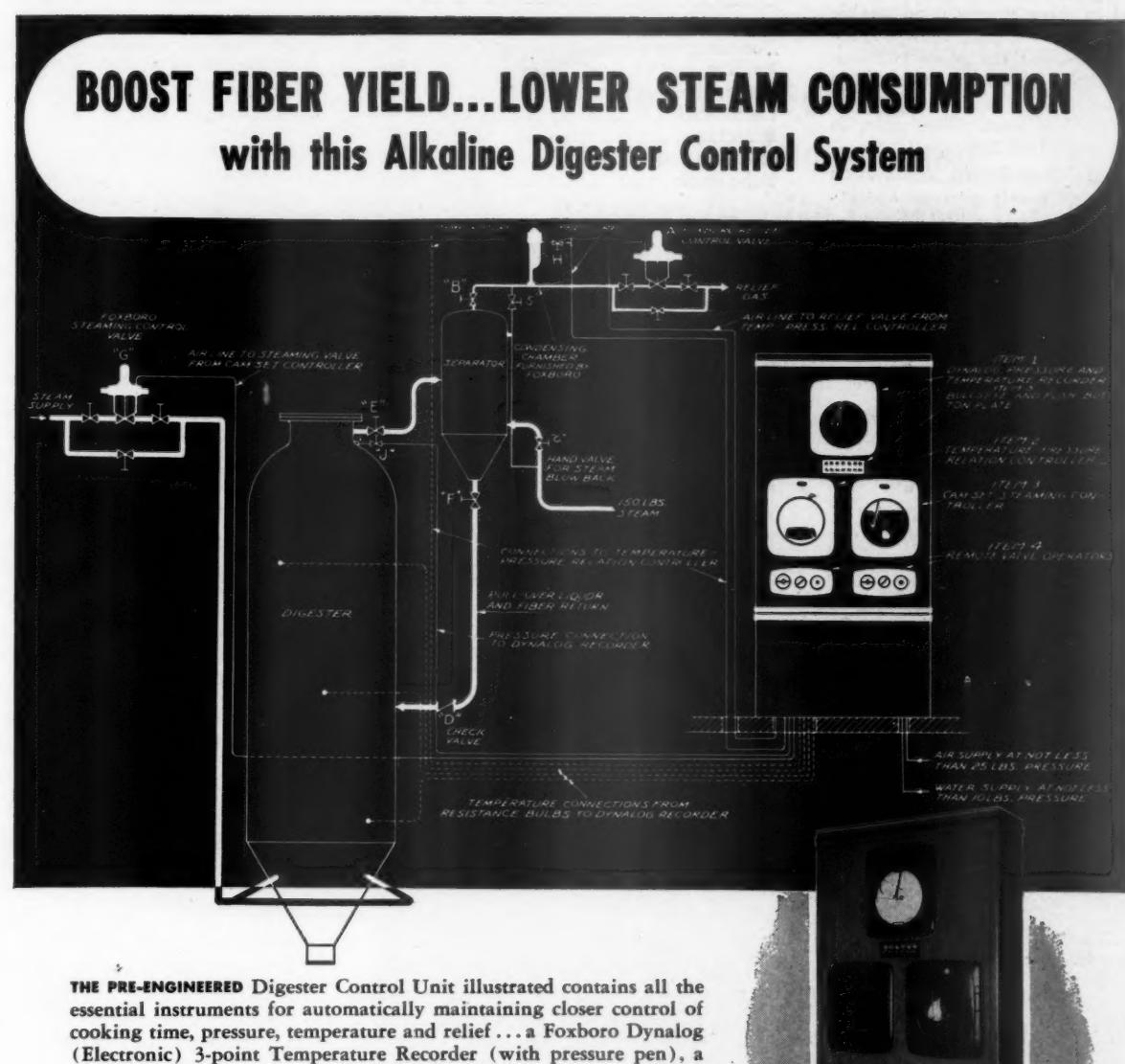
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NATIONAL PAPERBOARD ASSOCIATION

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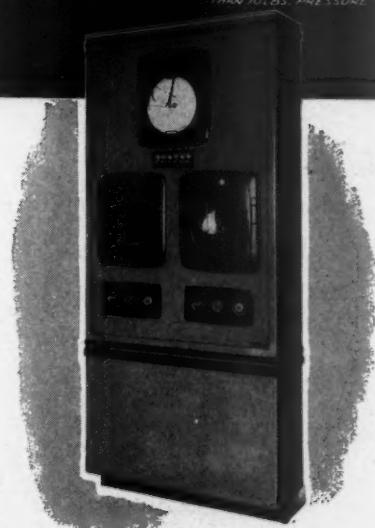
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THE PRE-ENGINEERED Digester Control Unit illustrated contains all the essential instruments for automatically maintaining closer control of cooking time, pressure, temperature and relief... a Foxboro Dynalog (Electronic) 3-point Temperature Recorder (with pressure pen), a Cooking Schedule Controller with adjustable cam-set control point and a Digester Relief Controller. The Dynalog Recorder comes with an automatic switching unit which gives temperature readings at three different points in digester or, if preferred, two points in digester and one in circulation line.

This cabinet type of control offers complete centralization and operating convenience. It protects instruments from dust and damage. Furthermore, it provides the benefits of experienced factory methods and materials in the wiring and piping of instruments into a properly integrated assembly. This also permits substantial savings in installation time and cost.

Here's the modern way to improve pulp quality and uniformity... to reduce steam, chemical, and labor requirements. Talk over your set-up with a Foxboro engineer. Get facts on installations at other mills. Similar units are available for sulphite processes. Write **The Foxboro Company, 254 Neponset Ave., Foxboro, Mass., U.S.A.**



FOXBORO Automatic Digester Control
Unit with controlled rate of temperature
rise. Dynalog Temperature Recorder at
top. Beneath are Foxboro Digester Relief
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Controller with cam-set control point.

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**AUTOMATIC
DIGESTER CONTROL**

nearly half a million tons since 1946 to 2,249,700 tons, just about twice the 1938 figure. And in these grades considerable increased capacity is coming into production in 1948. As for the more common jute grades, these rose by a half million also, from 1946 to 1947, with a record attained of 7,067,100 tons. This, also, is virtually twice the 1938 figure.

The National Paperboard Association reported the 1947 yearly average operating ratio of its member mills (based on "inch-hours") as 98% with a high of 103% in February, 1947, and over 100% recorded in four other months.

A Bureau of Census table of statistics on paperboard production of all types in the U. S., including certain building boards, is also published in this section. This shows a slightly higher total for all "paperboard" than the National Paperboard Association figures although the totals for containerboard and boxboard are less. However, the government has

U. S. PAPERBOARD PRODUCTION (In Tons)

	1944	1945	1946	1947
Container	4,228,304	4,130,424	4,315,000	4,799,000
Folding box	2,116,152	2,266,861	2,317,000	2,199,000
Set-up box	750,313	718,972	521,000	586,000
Cardboard	69,709	69,924	89,000	80,000
Building	1,087,467	1,121,824	956,000	1,214,000
Miscellaneous	710,623	597,623	1,291,000	1,516,000
Tube stock	458,107	361,034	-----	-----
Total	8,962,568	8,905,628	9,490,000	10,394,000

Source—U. S. Census.

included other large categories such as building board and miscellaneous board. Gypsum and laminated wallboard were included, at least in some years.

The Bureau of Census table shows an all-time record high for all types of board production in the U. S. as 10,394,000 tons. This is 1,000,000 tons greater than the NPA total. In each of the categories listed by the government, there are new all-

time records and there has been a steady upward march in almost all divisions in recent years.

Building Board Production

As suggested earlier in this article, there is now developing a great deal of interest and activity in two other types of fiberboard, known more commonly as the hardboard and softboard classes of insulating or building board.

The U. S. Census Bureau also issues figures for these building boards which are measured in square feet of production rather than tons (1,000 sq. ft. of $\frac{1}{2}$ -inch board is equivalent to 750 lbs.). There may be some overlapping in these tables (there definitely has been in certain years) but here are the government statistics for "total building boards—hardboard in $\frac{1}{8}$ -inch equivalent, laminated fiberboard in $\frac{3}{16}$ -inch equivalent, and structural insulation in $\frac{1}{16}$ -inch equivalent":

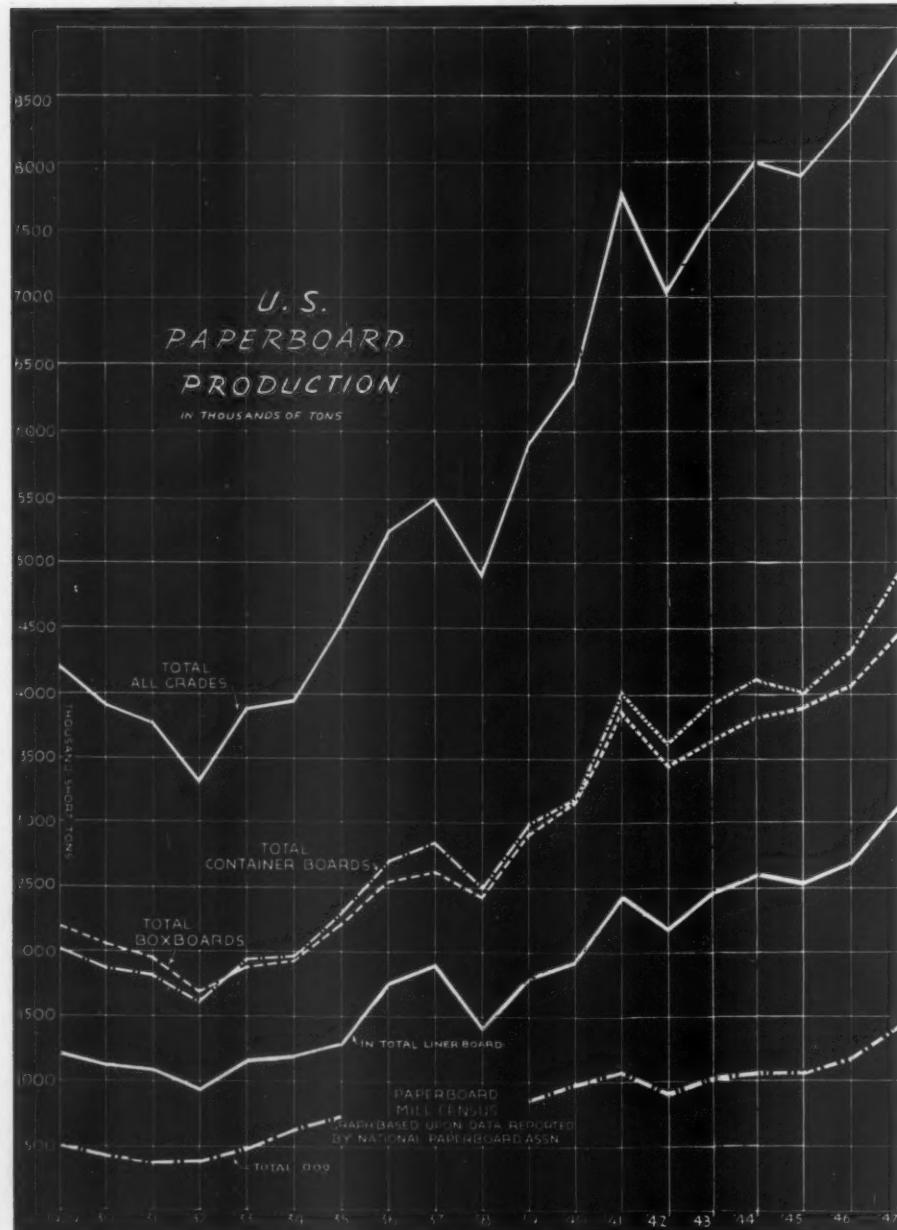
U. S. BUILDING BOARD PRODUCTION

Year	Millions of Square Feet
1947	3,300
1946	2,776
1945	2,742
1944	2,663
1943	2,645
1942	2,571
1941	2,240
1940	1,836
1939	1,258

This production, it will be seen, has almost tripled since 1939. At least 1 billion feet of the 1947 total was hardboard with insulating or softboard at something over 2 billion feet. In earlier years, the proportion of hardboard probably was somewhat less. But in both these categories most of this production is from wood pulp.

The clean-up of the forests, salvaging of former unused wood materials, much of which until now served only as fuel, is providing the raw material for much of this growth and the critical housing requirements of the nation are providing most of the demand.

The projected first Masonite plant outside of Laurel, Miss., in this country is planned in the Far West. The new Simpson Logging Co. insulation board plant, plans for a new U. S. Gypsum plant in the west, and other hardboard and softboard plants projected in British Columbia and Pacific Northwest states are all results of this movement, which is espe-



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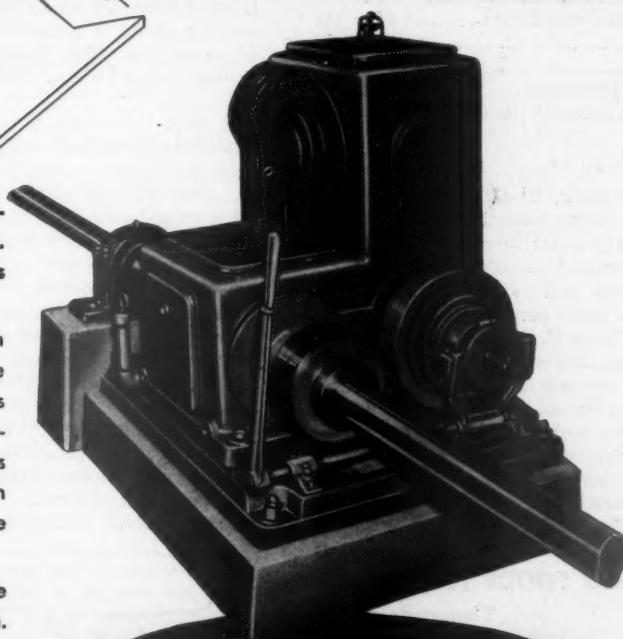
Installation of SYCO Drives has helped to increase paper output on each installation. SYCO contributes to quality control because it is smooth running . . . all the draws stay put.

The precise control mechanism of the modern SYCO Paper Machine Drive facilitates quick, close adjustment of sectional speed . . . then maintains the selected speed without departure. SYCO's interlocking synchronization holds the individual sections in precise speed ratio — preserving uniform tension on the sheet at all times. Breaks are fewer — the machine stays in production with less time out.

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Syracuse, N. Y.

cially strong on the Pacific Coast where up to 20 or 30 cords may be salvaged from already logged-off lands. New Johns-Manville (Natchez, Miss.) and Armstrong Cork (Macon, Ga.) wallboard plants have been built.

In the South also, Celotex, big user of cane bagasse, and Flintkote, have spent millions in expansion. The first hardboard plant for Mexico is being discussed.

Food Industries Will Use More Paperboard

The U. S. food processing industries, recovering from unfavorable market conditions faced in 1947, are expected to require a heavier tonnage of paperboard and other paper products to package their 1948 production, according to preliminary estimates. Indications at this writing are that the 1948 packs of canned, dried, frozen and glassed foods will run approximately three per cent above 1947.

The 1948 output of all major U. S. canned foods is expected to total about 575 million standard cases, of the sizes commonly used for each product. This compares with the 1946 and 1947 figures as follows, in millions of standard cases:

U. S. FOOD PACKS Millions of Cases

Item	1946*	1947
Fish	18	19
Meat	27	21
Poultry	2	1
Baby foods	15	12
Soups	48	40
Non-seasonal vegetables	53	43
Milk	73	76
Fruits	79	72
Seasonal vegetables	186	160
Fruit and vegetable juices	129	97

*Revised.

630 541

The 1948 pack, therefore, will require moderately larger quantities of labels and fiber shipping cases than did 1947 operations, the present situation indicates.

Fiber cases and cartons are used for packaging a large percentage of the products of the large U. S. dried food business. This industry has supplied a considerable tonnage of products for foreign relief purposes during recent years, and anticipates some sizeable orders via the Marshall or European Recovery Plan. Hence, its 1948 volume is expected to be around 2,200,000 tons, compared to the following production in 1946 and 1947 (thousands of short tons):

DRIED FOODS PACKS

Item	1946*	1947
Dried fruits	504	607
Dried beans and peas	1,131	1,184
Dried eggs	63	43
Dried milk, edible	420	419
Dehydrated vegetables	27	25

*Revised.

2,145 2,278

The U. S. frozen food industry, after a bad year in 1947 occasioned by oversupply and some off-quality, has made important strides forward during the winter of 1947-48. Production, which was curtailed se-

verely in 1947, is expected to move upwards this year. Indications point to a total output of approximately 2,290,000 lbs. of all types of commercial frozen foods, which compares with earlier seasons as follows:

U. S. FROZEN FOOD PRODUCTION

In Millions of Pounds

1936-40

Item	Average	1946*	1947
Fruits	138	528	352
Vegetables	66	453	346
Juices	(above)	5	7
Eggs	178	392	365
Fish	183	280	247
Specialties	—	45	40
Poultry**	101	317	317
Meats**	294	275	499
Totals	960	2,282	2,173

*Revised. **Year-end stocks; no pack data compiled.

Of the above products all except fruits,

fish, poultry and meats are largely packed in fiber cartons and cases, and a considerable percentage of the latter also are so packaged. The trend in this industry has been toward increasing emphasis upon consumer sizes of containers, and the business seems likely to follow in that direction again in 1948.

The glassed foods industry, whose jars and bottles are always packed in fiber cases, enjoyed a rapid rise during the war period, due both to shortage of tin-plate and also to sound promotional work. The U. S. output, estimated at only 105 million cases, rose to a peak of 289 millions in 1944. Since then it has dropped back moderately, and in 1947 the estimated total production was 250 million cases. The industry seems to have levelled off at about that point, and indications are that the 1948 pack, and corresponding demand for cases, will be about on a par with 1947.

Paperboard Industry Faces Battle

One of the important postwar trends affecting paperboard and packaging papers is sale of fruit and vegetables to be sold as a luxury items, individually wrapped, and tomatoes are already commonly marketed in this way. Coffee is going to return to a paper bag, vacuum-sealed. Development of air transportation has seen flowers flown by air in transparent boxes and air cargo is considerably influencing all packaging. The spread of the supermarket has put a new demand on packaging.

A realistic approach requires that the paperboard industry and other makers of packaging papers watch competition closely. The tin and glass interests are set for a giant battle. The light weight metal people are definitely trying to talk the cigarette manufacturer into a semi-rigid light metal pack which will not crush cigarettes. A metal manufacturer is getting ready to market an aluminum shopping bag, and individual aluminum alloy shopping bags.

However, there are natural fields for the invasion of paper. One of the most important is the individual packaging of fresh farm produce to reduce weight and transportation charges.

It's going to be a battle royal.

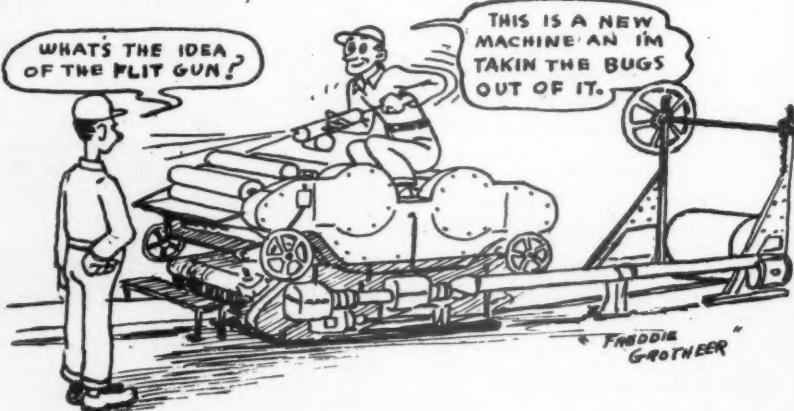
There is evidence that research and development of wet strength and other superior paperboards have increased its sales in themselves.

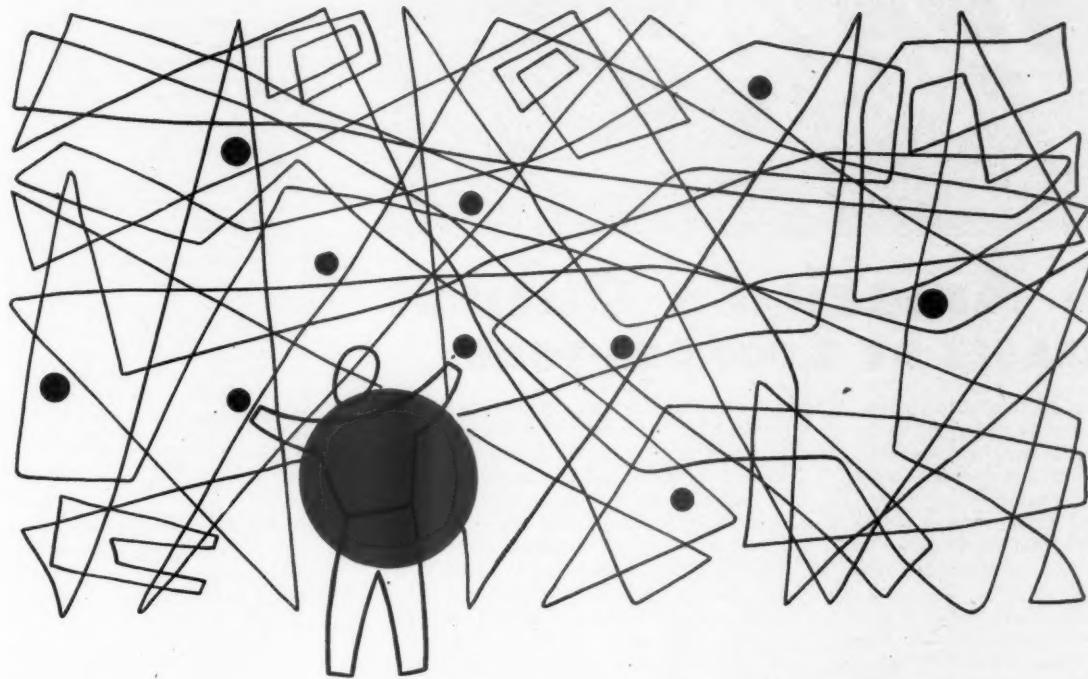
Just as one phase of paperboard use, the aviation industry expects a five-fold increase in the next years for paperboard for serving meals on airliners.

D. F. Magarrell, vice president, Passenger Service United Air Lines, predicts, "in our Mainliners, we will be serving over 3,000,000 flight-meals yearly by 1950, a sizeable increase over the 600,000 served during the twelve months of peace before 1941."

"The aviation industry is striding ahead perfecting and producing bigger and better airplanes, and yearly more and more passengers will do their traveling via the air lanes. The demand for paper products will also increase accordingly," he asserts.

THIS CARTOON is the handiwork of FREDDIE GROTH, Head Engraver in the Bag Division printing department of Union Bag & Paper Corp.'s mill at Savannah, Ga.





Simple

There's no confusion with Langston's improved method of slitting! Through a simple and convenient control, the front shaft is movable both radially and laterally. Slitter blades disengage simultaneously and swing out from rear slitters, providing ample room with three lock positions: (1) thread-up, (2) set-up, (3) operating.

Samuel M. Langston Company, Camden, New Jersey.



Langston

SLITTERS AND ROLL WINDERS



North America's Output INCREASES BY 2,000,000 TONS

WOOD pulp production and consumption records in North America zoomed to new all-time records last year, and everywhere from Ontario to Mexico capacities were continuing to be increased slightly and with due caution and careful planning. There is still a pulp shortage in domestic and world markets.

Total production in North America was over 19,000,000 tons compared with less than 17,000,000 in 1946, previous high.

Barring a wartime situation, a gradual leveling off of demand was generally anticipated in the not too distant future but even with closer wood utilization and salvage logging, wood pulp supply is not likely to be any too plentiful for a long time to come. The demand in rayon and plastics as well as in the paper industry indicates that demand

will continue strong, stimulated by this new rivalry between these industries.

A most unusual situation which has developed in the market pulp field is that the manufacturers of market pulp on the North American continent have continued to hold contract prices substantially lower than the prices asked for overseas pulp. This would seem to indicate that the American and Canadian producers were taking a long view and seeking to build up a relationship with pulp users that will engender good will and close relations for a long time to come.

With the end of the war, the overseas pulp from Europe has not figured as importantly in North American supply as it has in previous years, partly because of increased conversion of the pulp in Europe. With the unsettled condition of the world, the lessons of the past war are

Washington, Maine and Louisiana Are Leaders in Pulp

Current ranking of states in pulp production is a feature of this section of the Review Number but this year we are unable to present 1947 figures for states because of notification by the Department of Commerce that these figures will not be prepared until probably after mid-year.

However, it is unlikely that there would be any significant changes in the rankings as they have existed for several years. Tops in pulp production are these states, in order, with their 1946 totals (in some cases only the combined figures of two states were available):

Tons-1946

1. Washington	1,332,940
2. Maine	1,185,232
3. Louisiana	989,388
4. North and South Carolina	923,926
5. Wisconsin	889,139
6. Florida	694,504
7. Maryland and Virginia	647,172
8. New York	555,847
9. Mississippi	463,456
10. Alabama and Tennessee	455,837
11. Texas and Arkansas	426,411
12. Georgia	422,648
13. Oregon	406,716
14. Minnesota	318,605

The most important increases in capacity have been taking place in Georgia, Florida, Alabama and Washington state, so that in 1948 those states probably will increase their annual production substantially.

bringing the North American pulp and paper industries closer together. In the memory of many present leaders in both fields, there never were such close and amicable relations. They are both cognizant that war again would cut off overseas shipments and there could be other developments "short of war" that would dry up this source of supply. And again, as in 1940, this continent would be entirely dependent on its own resources. With all kinds of pulp, including the "smokeless powder" type, now recognized as among the most important war materials, it is recognized as of even greater importance

(Continued on Page 106; tables on 104b)

TOTAL UNITED STATES PRODUCTION OF WOOD PULP By Grades — 1925-1947

(Tons of 2000 pounds)

Year	Total	Unbleached Sulfite	Bleached Sulfite	Total Sulfate	Groundwood	Soda	All Other
1925	3,962,217	790,510	612,576	409,768	1,612,019	472,647	64,697
1926	4,394,766	911,729	646,466	519,960	1,764,248	496,920	55,463
1927	4,313,403	872,411	680,288	603,253	1,610,409	487,478	59,564
1928	4,510,800	836,751	722,107	774,225	1,610,988	488,641	78,088
1929	4,862,885	848,754	839,953	910,888	1,637,653	520,729	104,908
1930	4,630,308	815,897	751,166	949,513	1,560,221	474,230	79,281
1931	4,409,344	675,859	740,812	1,034,291	1,449,240	374,054	135,088
1932	3,760,267	548,702	596,937	1,028,846	1,203,044	290,703	92,035
1933	4,276,204	601,102	726,473	1,259,351	1,197,553	457,790	33,935
1934	4,281,428	599,905	806,612	1,240,967	1,253,398	477,089	35,457
1935	5,032,299	634,947	944,620	1,467,749	1,355,819	485,162	144,002
1936	5,695,219	693,903	1,127,039	1,794,734	1,475,620	557,695	46,228
1937	6,713,576	791,575	1,348,669	2,139,087	1,600,667	507,548	326,030
1938	5,933,560	601,855	2,004,621	2,443,057	1,333,308	395,307	155,418
1939	6,993,000	729,000	1,217,000	2,963,000	1,445,000	442,000	198,000
1940	8,960,000	996,000	1,612,000	3,748,000	1,579,000	532,000	493,000
1941	10,375,000	1,216,000	1,703,000	4,527,000	2,152,000	480,000	663,000
1942	10,783,000	1,213,000	1,717,000	4,738,000	1,756,000	462,000	897,000
1943	9,680,000	883,000	1,553,000	4,236,000	1,638,000	419,000	951,000
1944	10,108,000	863,000	1,523,000	4,549,000	1,639,000	413,000	1,122,000
1945	10,165,000	816,000	1,542,000	4,469,000	1,697,000	430,000	1,210,000
1946	10,046,403	784,437	1,692,077	4,597,331	1,951,456	466,896	*554,206
1947	11,153,052	895,676	1,896,628	5,276,011	2,050,075	495,940	*538,722

Source: Bureau of the Census.

1925 through 1939, data on "exploded" included in "Groundwood" and thereafter in "All Other."

*Several mills beginning in 1946 were transferred from this column to groundwood both in U. S. Census and U. S. Pulp Producers Assn. classification.



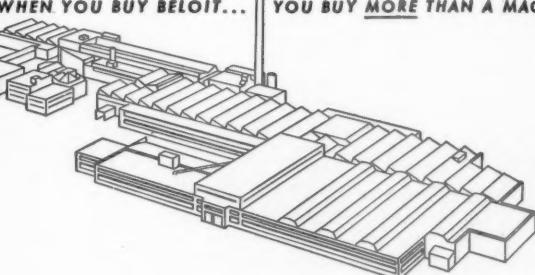
Need floor-level drives?

In mills requiring floor-level drives, Beloit short center hypoid units have been giving satisfactory service over a number of years. Adjustable V-belts and sheaves are used with a line shaft on the machine

room floor. Mill operators find that this equipment eliminates many troubles and is virtually maintenance-free. A number of installations currently are being made.—*Beloit Iron Works, Beloit, Wis.*



WHEN YOU BUY BELOIT... YOU BUY MORE THAN A MACHINE!



BELOIT

PAPER MACHINERY

U. S. IMPORTS OF WOOD PULP BY COUNTRIES AND GRADES

(In tons of 2000 pounds, air dry weight)

	All Countries	Canada & Newfoundland	Mexico	Sweden	Finland	Norway	Russia
All Grades Wood Pulp:							
1945	1,754,065	1,081,840	-----	672,261	-----	-----	-----
1946	1,805,418	1,245,084	-----	445,114	115,220	-----	-----
1947	2,331,648	1,530,613	7,342	555,215	223,973	9,577	4,928
Rayon & Special Grades of Bleached Sulfite:							
1945	146,032	142,399	-----	3,633	-----	-----	-----
1946	202,192	189,775	-----	10,978	1,439	-----	-----
1947	248,606	224,882	-----	21,274	780	1,670	-----
Paper Grades of Bleached Sulfite:							
1945	242,424	190,187	-----	52,237	-----	-----	-----
1946	222,653	195,112	-----	17,193	10,348	-----	-----
1947	288,559	229,771	-----	26,654	27,156	4,978	-----
Unbleached Sulfite:							
1945	657,297	370,151	2,128	285,018	-----	-----	-----
1946	618,571	410,843	669	172,181	34,878	-----	-----
1947	731,543	430,688	7,759	225,330	62,788	-----	4,928
Bleached Sulfate:							
1945	71,996	44,760	-----	27,236	-----	-----	-----
1946	79,697	56,213	-----	23,484	-----	-----	-----
1947	241,020	176,917	-----	64,103	-----	-----	-----
Unbleached Sulfate:							
1945	380,432	104,107	72	276,253	-----	-----	-----
1946	397,906	137,472	-----	206,859	53,575	-----	-----
1947	477,516	145,626	-----	205,366	118,953	229	-----
Groundwood:							
1945	222,710	194,275	590	27,845	-----	-----	-----
1946	250,175	220,576	200	14,419	14,980	-----	-----
1947	303,946	279,512	-----	12,438	14,296	2,700	-----
Soda:							
1945	21,157	21,118	-----	39	-----	-----	-----
1946	19,740	19,740	-----	-----	-----	-----	-----
1947	21,203	21,203	-----	-----	-----	-----	-----

Screenings: Imports totaled 15,255 tons in 1947, 14,484 tons in 1946 and 12,017 tons in 1945, all from Canada.

U. S. WOOD PULP IMPORTS — From Europe and North America by Grades

(In Short Tons)

	Bleached Sulfite	Unbleached Sulfite	Bleached Sulfate	Unbleached Sulfate	Ground-wood	Soda	Total
	Paper Grades	Non-Paper Grades	Sulfite	Sulfite	Sulfate	Sulfate	
Total from Europe:							
June-December, 1945	52,237	3,633	285,018	27,236	276,253	27,845	39 672,261
1946	27,541	12,417	207,059	23,484	260,434	29,409	0 560,344
1947	58,788	23,724	293,096	64,103	324,548	29,434	0 793,693
First Two Months, 1948	10,992	1,252	82,607	11,356	66,558	2,738	0 175,503
Total from Canada, Newfoundland, Labrador, Mexico:							
1945	190,187	142,399	372,279	44,760	104,179	194,865	21,118 1,081,894
1946	195,112	189,775	411,512	56,213	137,472	220,776	19,740 1,245,084
1947	229,771	224,882	438,447	176,917	153,010	279,512	21,203 1,537,955
First Two Months, 1948	33,631	33,041	68,678	29,828	22,667	39,139	3,843 233,220

Source: Department of Commerce.

RECORD OF TYPICAL PULP PRICES IN THE UNITED STATES

	Swedish Bleached Sulfite		Domestic Bleached Sulfite		Swedish Unbleached Sulfite		Swedish Unbleached Kraft		Canadian Bleached Sulfite	Canadian Bleached Kraft	Canadian Unbleached Sulfite
	High	Low	High	Low	High	Low	High	Low	High	Low	High
*1939	\$60.00	\$43.00	\$50.00	\$50.00	\$50.00	\$36.00	\$42.50	\$28.00	-----	-----	\$74.00 Del.
(Del.) (Dock)	-----	-----	(Del.) (Dock)	(Del.) (Dock)	(Del.) (Dock)	(Del.) (Dock)	\$86.00 Del.	-----	-----	-----	-----
**1944	\$86.00	\$82.00	\$86.00 Del.	\$74.00	\$70.00	\$73.00	\$69.00	94.00 Del.	-----	-----	82.00 Del.
***1946	\$94.00	\$91.00	94.00 Del.	82.00	79.00	82.00	79.00	-----	-----	-----	-----
1947	\$180.00	\$120.00	\$135.00	\$115.00	\$155.00	\$95.00	\$150.00	\$90.00	-----	-----	-----
April 1, 1948	\$195.00	\$185.00	166.00	126.00	157.00	140.00	155.00	147.50	\$190.00	\$135.00	\$150.00 \$126.00 Del.
(Dock) (Dock) (f.o.b. mill) (Del.) (Dock) (Dock) (Dock) (Dock) (Del.) (Del.) (Del.) (Del.)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Bleached sulfite pulp was priced at \$80 in the late 1920's but then took deep dips in the 1930's—as low as \$35, which was a serious threat to the continued existence of a U. S. industry.

*Regarding 1939 prices, these prices are considered representative, but it is difficult to get dependable and authentic data.

**First increase in 3 1/2 years of war period under OPA came in early 1944.

***Another OPA increase was allowed on April 11, 1946. OPA controls were released in December, 1946.



Bleach Liquor Prepared in 30 Minutes...

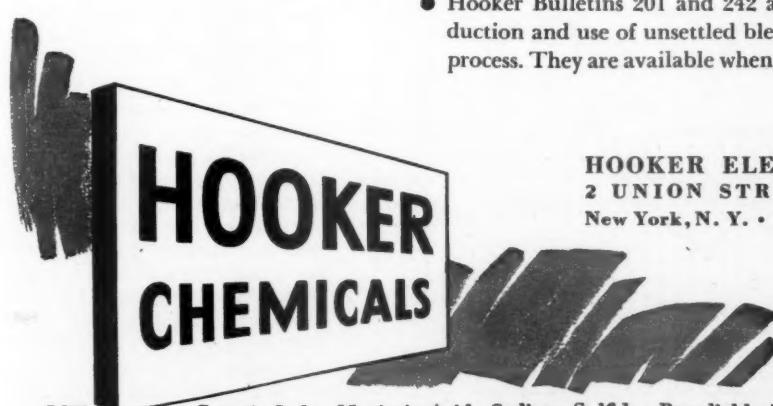
Preparing bleach liquor by introducing chlorine into excess milk of lime and waiting for it to settle is a time consuming process. In addition, it entails an expensive outlay for settling tanks and large storage facilities, the inconvenience of waiting and of sludge washing to say nothing of high labor costs. Nor can clear bleach liquor be used to buffer the bleaching operating beyond the solubility of lime.

These weaknesses in the preparation of bleach liquor were of concern to Hooker Technicians who realized that economies in pulp and paper production help Hooker as well as the industry. After a thorough investigation, Hooker Technicians, working with the pulp and paper industry, showed how a bleach liquor could be prepared so as to be used without settling and with resulting economies in equipment, labor and time. The key to this process is a low cost but effi-

cient screen for the removal of all but the finest of the insoluble particles of lime before chlorination. Also important to the process is the agitation of the lime during chlorination and storage.

Coincidentally with the development of this process and its equipment, Hooker Technicians suggested the use of this same type of screen for introducing clean lime for "liming" in the chlorination stage.

- Hooker Bulletins 201 and 242 are devoted to a discussion of the production and use of unsettled bleach liquor and the equipment for this process. They are available when requested on your company letterhead.



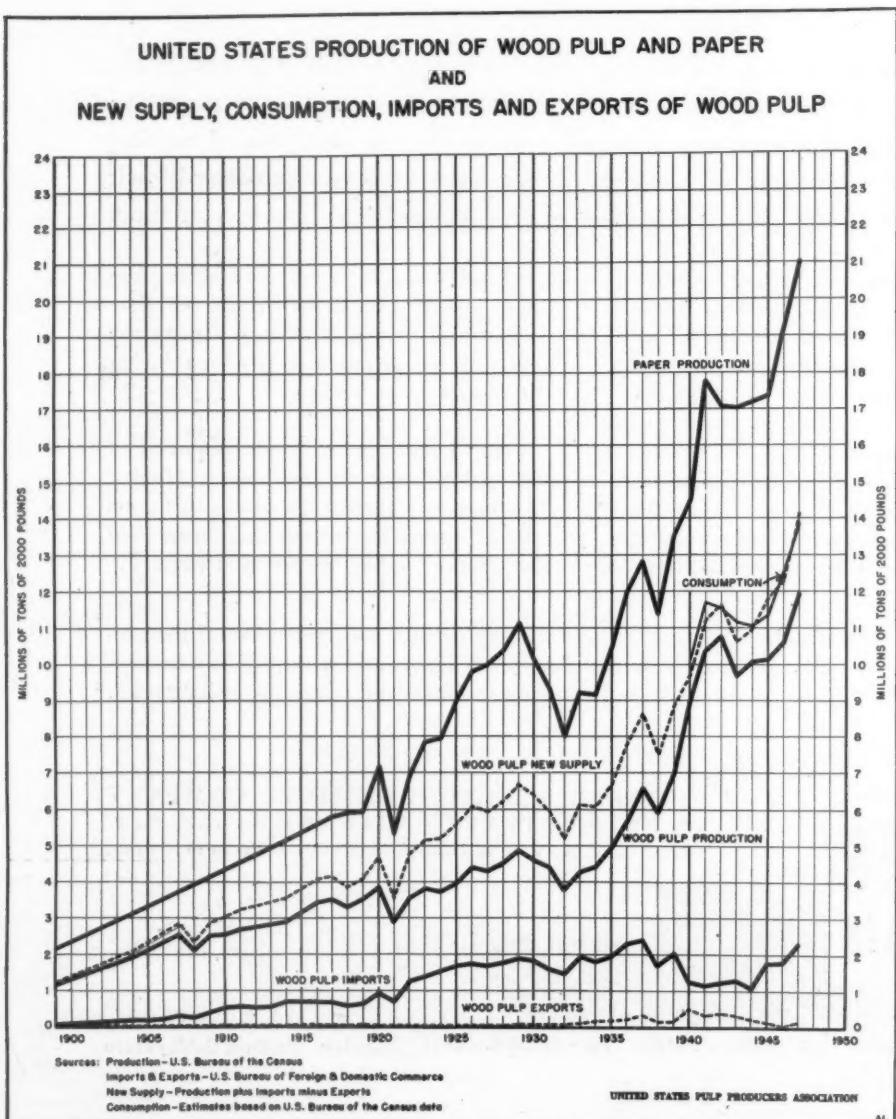
HOOKER ELECTROCHEMICAL COMPANY
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PROPORTION OF UNITED STATES MARKET FOR PULP SUPPLIED BY AMERICAN PULP MILLS AND FOREIGN PULP MILLS—1939-1944-1945-1946-1947

Tons—2,000 Lbs.

TOTALS By Grades.	Pulp Produced By U. S. Mills for Sale in Domestic Market — 1939	Pulp Imported Into United States — 1939	Pulp Produced By U. S. Mills for Sale in Domestic Market — 1944	Pulp Imported Into United States — 1944	Pulp Produced By U. S. Mills for Sale in Domestic Market — 1945	Pulp Imported Into United States — 1945	Pulp Produced By U. S. Mills for Sale in Domestic Market — 1946	Pulp Imported Into United States — 1946	Pulp Produced By U. S. Mills for Sale in Domestic Market — 1947	Pulp Imported Into U. S. — 1947
Total—All Grades	1,049,753	2,035,249	1,500,000	1,072,000	1,455,667	1,754,065	1,294,794	1,794,562	1,385,272	2,331,648
Total—Sulphite	685,774	1,135,302	946,635	712,000	945,150	1,045,753	930,601	1,043,617	1,003,072	1,268,708
Bleached Sulphite	464,296	474,109	752,713	321,000	738,461	388,456	777,709	425,028	836,042	537,165
Rayon, Special Chemical	106,760	88,052	420,921	135,000	346,541	146,032	289,809	202,375	390,728	248,606
Other	319,687	386,057	331,792	186,000	391,920	242,424	487,900	222,653	445,314	288,559
Unbleached Sulphite	219,012	661,193	193,922	391,000	206,689	657,297	152,892	618,589	167,030	731,543
Total—Sulphate	143,614	654,419	378,223	146,000	344,064	452,428	177,290	477,603	190,682	718,536
Bleached Sulphate	77,786	108,252	99,637	59,000	113,485	91,996	47,929	79,697	48,464	241,020
Unbleached Sulphate	65,793	546,167	278,586	87,000	230,579	360,432	129,361	397,906	142,218	477,516
Total Groundwood	30,194	227,432	50,015	168,000	52,779	222,710	55,310	239,436	60,880	308,946
Total Soda	86,591	8,952	96,843	16,000	83,398	21,157	85,891	19,740	72,603	21,203
Total Semi-Chemical			701	0						0
Total—Miscellaneous, Damaged and Off-Quality	16,189	192	27,958	30,000	30,276	12,017	45,702	14,166	58,035	14,255

"Pulp Produced by U. S. Mills for Sale in 'Domestic Market' includes that part of the stocks on hand at the end of the year intended for future shipment to domestic buyers. Imports include pulp to U.S. companies from wholly owned or affiliated companies in Canada. Imports are latest revised U.S. Dept. of Commerce figures. Source: United States Pulp Producers Association.



that a healthy and strong North American pulp industry be preserved.

U. S. wood pulp production of virtually 12,000,000 tons in 1947 was over 70% greater than 1939 production. U. S. imports gained 14% over that year, though now largely from Canada, and consumption was up more than 50%. But inventories were 6% less than at the close of 1939. As compared with 1946, production was up 12%, imports 28%, consumption 10% and inventories 45%.

Total Canadian wood pulp production apparently went over the 7,000,000 tons a year mark in 1947 for the first time in Dominion history. It was, officially, 6,390,000 tons in 1946, and the 1947 estimate was about twice the 1938 figure.

In Mexico where, **PULP & PAPER** has extended its survey for the first time this year, as the result of an "on-the-spot" survey by one of its editors, the government seems aiming toward building up a substantial native pulp industry. The first market kraft pulp mill in Mexico's history was built at Atenquique with capacity of 80 tons a day and two other new kraft mills have been built, while groundwood production also has been expanded. Mexico was only producing 18,600 tons of pulp in 1937 and 57,000 tons in 1947 but new capacity now coming in should up this to around 150,000 tons.

The 11,952,000 tons of wood pulp produced by U. S. mills in 1947 (according to U. S. Department of Commerce report) marked the first time that the record of 1942 was surpassed. This is also true of the 11,530,000-ton figure shown in the U. S. Pulp Producers' Association tables accompanying this article. Until 1947, the 1942 production of 10,783,000 tons had been high.

While sulfite pulp production was considerably lower than the record years in the early 1940's it is interesting to note that bleached sulfite pulp hit a high record for all time of 1,900,000 tons. This

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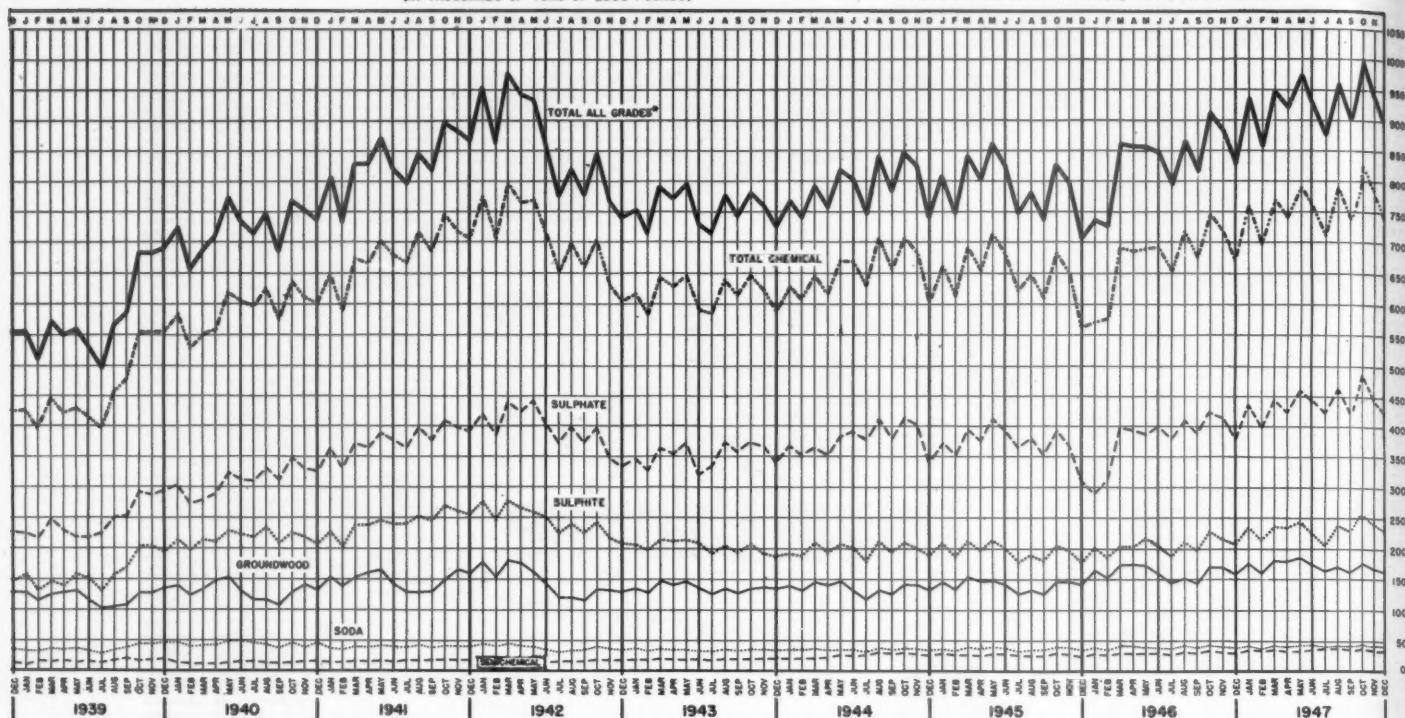
Pennsalt chlorine is manufactured at Wyandotte, Michigan; Tacoma, Washington; Portland, Oregon and is available from warehouses in your own locality. Pennsylvania Salt Manufacturing Company of Washington, Tacoma, Portland, Ore.

PENN **SALT**

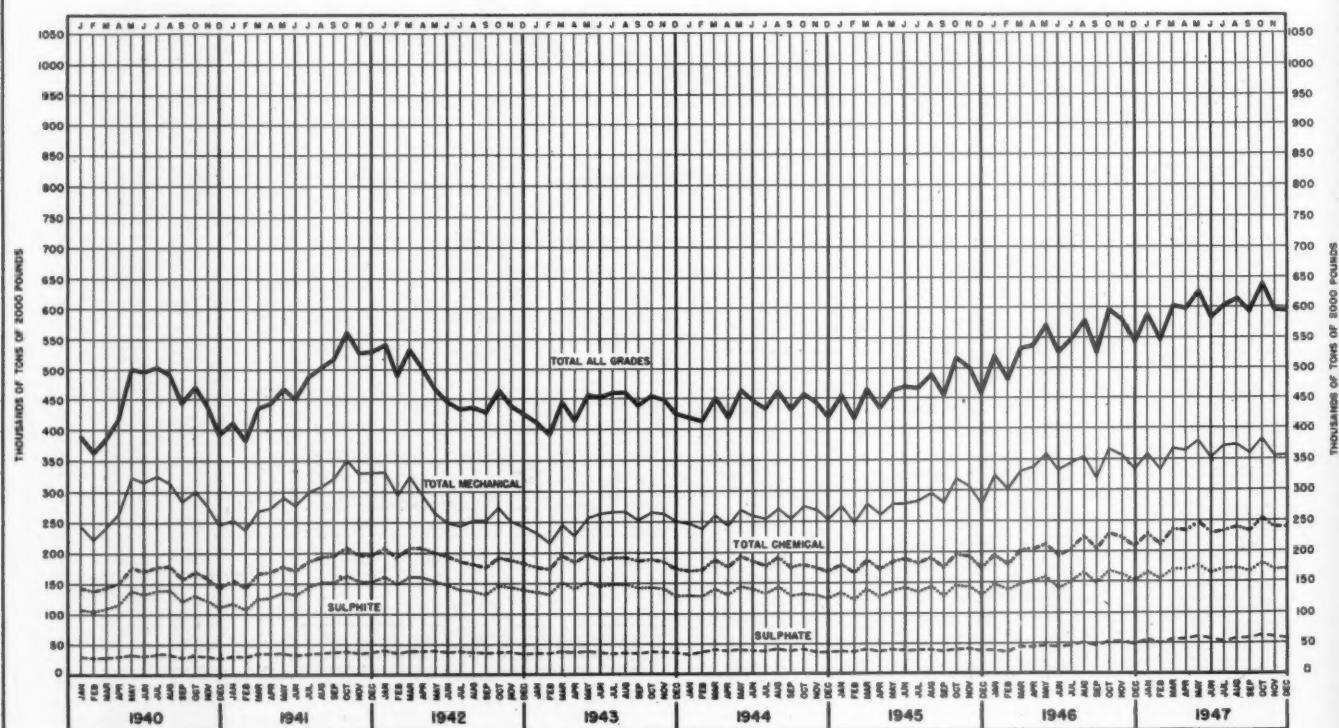
UNITED STATES WOOD PULP PRODUCTION

(IN THOUSANDS OF TONS OF 2000 POUNDS)

*Exclusive of defiltered and exploded wood pulp and cabled fiber
Source: Estimated for 100% of industry by U.S. Pulp Producers Association



CANADIAN WOOD PULP PRODUCTION



Source: Canadian Pulp and Paper Association

UNITED STATES PULP PRODUCERS ASSOCIATION

January 22, 1948

seems to indicate there is still a strong market for bleached sulfite pulps despite the strong trend toward kraft and it reflected the demands for this pulp for rayon and plastics.

Kraft pulp production showed a phe-

nomenal gain of three-quarters of a million tons in one year, hitting a record high of 5,265,000 tons. This was double the production in the late '30s.

For the second consecutive year production of wood pulp in Canada scored

a sharp increase during 1947 and rose to a new all-time high substantially above any former calendar twelve-month. With the increase last year, the industry in Canada boosted its total output of pulp to above the seven-million-ton mark for



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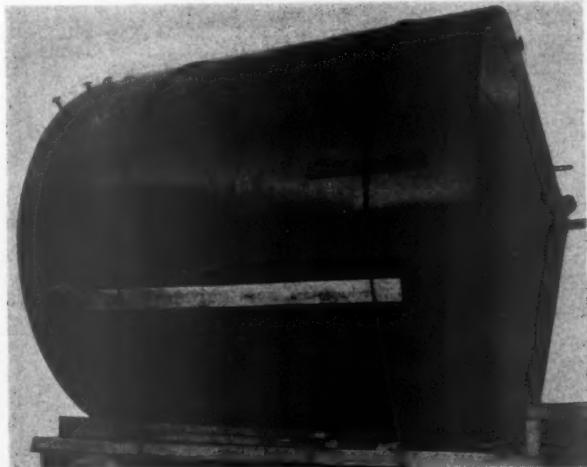
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FINLAND'S EXPORTS OF CHEMICAL PULP

(In short tons, dry weight)

	—1947—		—1946—		—1945—		—1944—	
	Sulfite Tons	Sulfate Tons	Sulfite tons	Sulfate tons	Sulfite tons	Sulfate tons	Sulfite tons	Sulfate tons
Soviet Union	11,496	12,236	39,322	46,456	106,050	67,365	6,735	7,986
Britain	111,412	91,198	80,306	76,275	39,358	19,531	-----	-----
U. S. A.	88,664	107,085	41,102	44,926	4,980	5,891	-----	-----
France	15,599	9,124	8,776	613	-----	-----	3,423	1,872
Holland	-----	-----	-----	-----	-----	-----	1,070	774
Germany	-----	-----	-----	-----	-----	-----	62,468	40,899
Denmark	16,189	8,280	14,519	4,753	7,320	9,749	18,624	13,613
South America	9,881	3,622	5,555	1,014	753	-----	-----	-----
Other	38,084	45,948	12,987	6,930	1,239	1,922	7,752	3,891
Total	291,325	277,493	202,567	180,967	159,700	104,458	100,072	68,835

Source: Finnish Paper & Timber Journal.

SWEDEN'S WOOD PULP EXPORTS TO ALL COUNTRIES

As Compared with Exports to the U. S.
(in short tons)

Years—	Bleached Sulfite	Unbleached Sulfate	Bleached Sulfate	Bleached Sulfite	Ground- wood
1938 (To All Countries).....	304,078	571,077	92,793	575,508	297,420
1944 (To All Countries).....	156,340	710,709	13,088	70,889	10,600
1945 (To All Countries).....	262,146	49,787	43,273	536,144	314,054
1945 (To U. S.).....	56,496	283,959	28,070	274,429	27,933
1946 (To All Countries).....	397,120	572,831	69,938	499,656	264,704
1946 (To U. S.).....	23,315	151,261	22,772	168,704	8,777
1947 (To All Countries).....	445,607	530,569	136,701	462,120	223,852
1947 (To U. S.).....	40,076	218,918	56,282	201,440	12,532

SWEDISH WOOD PULP IMPORTS BY U. S. (1931-39)

(Source: Foreign Commerce and Navigation of the U. S.—Monthly and Annual)

By Months	Average 1931-1935		Average 1936-1939		Average 1931-1939	
	Tons	Index	Tons	Index	Tons	Index
January	106,472	163.00	98,052	123.03	102,729	143.26
February	68,227	104.45	74,594	93.60	71,057	99.09
March	30,083	46.06	44,043	55.27	36,287	50.60
April	13,643	20.89	16,662	20.91	14,984	20.90
May	38,030	58.22	70,081	87.94	52,275	72.90
June	59,668	91.35	100,151	125.67	77,660	108.30
July	64,081	98.11	87,203	109.42	74,358	103.69
August	68,155	104.34	92,487	116.05	78,969	110.13
September	69,306	106.10	84,643	106.21	76,123	106.16
October	82,026	125.58	86,638	108.71	84,076	117.25
November	93,563	143.24	104,802	131.51	98,558	137.44
December	90,572	138.66	96,975	121.68	93,418	130.28
Year	783,826	100.	956,331	100.	860,494	100.
By Quarters						
First	204,782	104.50	216,689	90.64	210,073	97.65
Second	111,341	56.82	186,894	78.17	144,919	67.37
Third	201,542	102.85	264,333	110.56	229,450	106.66
Fourth	266,161	135.83	288,415	120.63	276,052	128.32
Year	783,826	100.	956,331	100.	860,494	100.

WOOD PULP: EXPORTS FROM FINLAND, NORWAY AND SWEDEN, 1935 AND 1937

DESTINATION	(Tons of 2,000 Lbs.)					
	FINLAND		NORWAY		SWEDEN	
	Tons	%	Tons	%	Tons	%
UNITED STATES	287,069	21.5	288,926	17.8	94,232	16.6
SOUTH AMERICA	16,505	1.2	56,743	3.5	6,674	1.2
JAPAN	32,043	2.4	41,445	2.6	48,738	8.5
EUROPEAN COUNTRIES	999,193	74.7	2,128,432	75.2	406,952	71.7
Great Britain	657,015	42.1	519,972	50.6	289,642	51.0
France	105,679	7.9	151,779	11.2	32,646	5.8
Germany	39,575	3.0	42,739	2.6	14,149	2.5
Belgium	30,973	2.3	30,776	1.9	22,578	4.0
Italy	52,170	3.9	56,163	3.5	5,062	1.4
Spain	17,968	1.4	9,168	0.6	9,343	1.6
Netherlands	13,728	1.0	30,632	1.9	20,157	3.6
All Other European Countries	82,065	6.1	17,201	2.9	10,075	1.8
ALL OTHER COUNTRIES	1,071	0.2	14,750	0.9	11,166	1.9
TOTAL	1,357,881	100.0	1,620,296	100.0	567,764	100.0
					723,515	100.0
					2,318,048	100.0
					2,813,616	100.0

a/ Includes all American countries except United States.

SOURCE: WORLD WOOD PULP STATISTICS
UNITED STATES PULP PRODUCER'S ASSOCIATION, 1937 and 1938.

the first time, or better than half a million tons in excess of the previous yearly record established in the year before. A table on Canadian production accompanies this article.

Consumption of Pulp

United States consumption of wood pulp in 1947 established a new all-time high, totaling 13,326,000 short tons, 1,234,000 tons above 12,092,000 tons in 1946, figures prepared by the Bureau of the Census, U. S. Department of Commerce, disclose.

Of the 1947 total consumption of wood pulp, all major grades, except unbleached sulfite, which showed a decline of 1,000 tons, registered increases over 1946. Consumption of bleached sulfite amounted to 1,798,000 tons in 1947, compared with 1,680,000 tons in 1946; unbleached sulfite, 1,464,000 tons against 1,465,000 tons; bleached sulfate, 1,079,000 tons, against 833,000 tons; semi-bleached sulfate, 210,000 tons, against 184,000 tons; unbleached sulfate, 4,585,000 tons, against 4,124,000 tons; soda pulp, 524,000 tons.

Assisted by an import balance of 2,209,000 tons the U. S. pulp production of 11,956,000 tons surpassed all previous records in providing paper mill and other consumers with 14,165,000 tons of new supply during the year, it was pointed out by Fred F. Stevenot, president of the Puget Sound Pulp & Timber Co. In comparison, domestic production of 10,607,000 tons plus import balance of 1,759,000 tons,

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PAXTON-MITCHELL CO.	ROD PACKING
KOPPERS COMPANY	PISTON RINGS

U. S. CHEMICAL PULP IMPORTS SINCE 1922 AND DECLARED VALUE

	Tons	Value
1947	2,012,727	\$237,856,869
1946	1,549,342	124,125,869
1945	1,524,449	118,644,099
1944	*878,000	-----
1943	*1,034,000	-----
1942	*988,000	-----
1941 (12 mos.)	*941,000	-----
1941 (9 mos.)	674,320	42,831,566
1940	1,053,660	55,481,017
1939	1,798,459	70,659,074
1938	1,551,917	69,181,811
1937	2,176,343	93,955,854
1936	2,050,051	78,839,776
1935	1,743,602	67,483,566
1934	1,616,754	58,605,219
1933	1,731,513	54,184,001
1932	1,293,495	43,652,916
1931	1,386,112	56,409,638
1930	1,533,646	74,140,504
1929	1,614,043	82,840,220
1928	1,513,125	78,476,280
1927	1,433,919	80,124,449
1926	1,431,973	83,208,851
1925	1,334,900	73,469,063
1924	1,279,177	68,678,210
1923	1,084,013	65,495,800
1922	1,043,832	57,600,844

*Estimated.

Source: U. S. Department of Commerce.

U. S. WOOD PULP EXPORTS

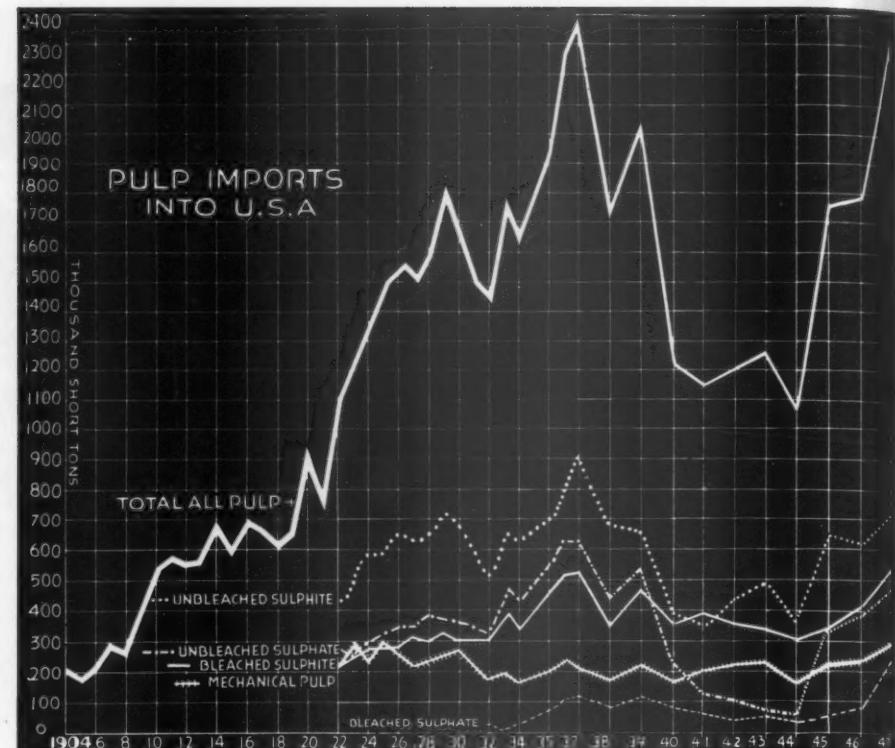
	Quantity and Value	
	Short Tons	Value
1947	134,855	\$18,212,932
1946	39,361	3,645,963
1945	*140,000	-----
1944	*184,000	-----
1943	*263,000	-----
1942	*380,000	-----
1941	*322,000	-----
1941 (9 mos.)	246,986	\$15,801,270
1940	480,362	29,649,300
1939	139,504	6,493,140
1938	140,484	9,986,826
1937	302,050	19,891,483
1936	193,485	10,600,176
1935	171,710	8,632,971
1934	142,931	7,005,559
1933	79,191	3,113,883
1932	47,860	2,037,553
1931	53,307	2,405,642
1930	48,426	2,070,553

*Estimated by U. S. Pulp Producers Assn.
Source for all other figures: U. S. Dept. of Commerce.

made up 12,366,000 tons of new supply in 1946.

Considerable variation in amount and rate of increase in new supply of different classes of pulp, 1947 compared with 1946, was observed by Mr. Stevenot. New supply of sulfite pulps amounting to 3,961,000 tons were 478,000 tons or 13.7 per cent higher than in 1946; sulfate pulps, totaling 5,972,000 tons, were 911,000 tons or 18.0 per cent more plentiful; ground-wood, of which the year's total supply was 2,363,000 tons, recorded an increase of only 192,000 tons or 8.1 per cent.

Canada and Newfoundland shipped us 1,529,000 tons of pulp in 1947, an increase of 295,000 tons over 1946, while Scandinavian countries supplied 786,000 tons,



226,000 more than the year before. Mexico and Russia, newcomers in this market, shipped us 12,000 tons in 1947.

"Among the year's favorable developments was improvement in the market supply of pulp," said Stevenot. "Against the over-all increase of 14.6 per cent, the supply of market pulp rose 18 per cent. This trend is beneficial to converting mills which have no pulp-making facilities of their own. These mills compose a considerable part of the paper and paperboard industry of this country; they have been among the hardest pressed by the pulp shortage of recent years."

The industry's expanded facilities operating at capacity may improve the 1947 pulp supply record in 1948 in Mr. Stevenot's opinion.

How Production Grew

While having its inception during 1939, the present era of expanded wood pulp production in the United States did not get into full swing until 1940, in which year an impressive forward spurt in pulp manufacture was registered to carry production in this country to a higher level by a wider margin than ever previously witnessed.

This upward surge continued in 1941, and in 1942 a further gain carried total pulp output to a new high of better than ten and three-quarters millions of tons, or to be exact, 10,783,430 short tons, which had stood as the record annual pulp output for the United States prior to last year. Then in 1943, wartime shortages and difficulties led to a downward turn in pulp production, and the total output in that year fell below 10,000,000 tons. Nevertheless, despite continuing wartime handicaps, production forged ahead again during 1944 to climb to more than a hun-

dred thousand tons in excess of the 10,000,000-ton mark, and during 1945 a further small increase was recorded over the preceding year. Another sharp spurt in output was seen in 1946 when the total was almost half a million tons above the 1945 level. And now the broad climb in production during the past year carries the total to a new high substantially above the previous record.

Contrasted with pre-war years, last year's pulp output constituted a tremendous gain, and certainly attests to the laudable efforts put forth by domestic pulp manufacturers under difficult conditions to provide for the pulp requirements of the nation. By way of apt example, it need only be pointed out that during the ten years prior to the outbreak of the last war in Europe, or from 1929 to 1938 inclusive, annual pulp output in the United States averaged less than 5,000,000 short tons, or to be precise, 4,956,000 tons, so that the 1947 production was more than twice or 6,995,548 tons or 141.1 per cent in excess of the pre-war yearly average.

A glance at the statistics shows that in 1938 the output of pulp in this country was 5.9 million short tons; in 1939, 6.9; in 1940, 8.9; in 1941, 10.3; in 1942, 10.7; in 1943, 9.6; in 1944, 10.1; in 1945, 10.1; in 1946, 10.6, and in 1947, 11.9 million tons. Thus, within a matter of nine calendar years, or prior to the start of the second world war in Europe, pulp manufacture in the United States has mounted from 5,933,560 short tons to 11,951,548 tons, an increase of just a trifle more than double or 6,017,988 tons or 101.4 per cent. In other words, United States producers now are making two tons of pulp for every one ton manufactured before the last war.

An interesting feature of the production figures for last year is that domestic



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Low maintenance cost • Rapid Circulation through the System • High Efficiency on Heavily Loaded Stock • Insensitivity to Ordinary Fluctuation in White Water Flow • Ease of Cleaning

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295 MADISON AVENUE, NEW YORK 17, N.Y.

In Canada: ALEXANDER FLECK, LIMITED
416 WELLINGTON STREET, OTTAWA, ONTARIO



CANADIAN PULP PRODUCTION

(Tons of 2,000 lbs.)

	Mechanical Tons	Sulfite Tons	Alkaline Tons	Total Tons		Mechanical Tons	Sulfite Tons	Alkaline Tons	Total Tons
1920	1,090,114	654,273	188,487	1,922,774	1934	2,340,441	1,020,493	205,980	3,566,914
1921	931,560	476,929	131,337	1,539,826	1935	2,458,000	1,025,000	206,000	3,689,000
1922	1,241,185	678,878	217,862	2,137,925	1936	2,910,338	1,168,927	273,494	4,352,759
1923	1,449,106	749,668	224,812	2,413,586	1937	3,308,517	1,373,232	312,741	4,994,490
1924	1,427,782	768,035	218,207	2,414,024	1938	2,650,000	925,000	258,000	3,833,000
1925	1,621,917	842,785	242,207	2,706,909	1939	2,738,011	1,028,820	313,628	4,080,459
1926	1,901,268	995,203	256,074	3,152,545	1940	3,305,484	1,480,545	399,267	5,290,762
1927	1,922,124	1,016,060	262,512	3,200,696	1941	3,494,922	1,664,516	426,743	5,720,847
1928	2,127,699	1,117,227	256,969	3,501,895	1942	3,260,097	1,753,453	459,254	5,472,804
1929	2,420,774	1,236,232	250,104	3,907,110	1943	2,998,913	1,712,571	441,421	5,152,905
1930	2,283,130	1,076,804	188,253	3,548,187	1944	3,076,296	1,609,629	467,726	5,153,651
1931	2,016,480	941,586	145,156	3,103,222	1945	3,341,920	1,639,684	478,740	5,460,344
1932	1,696,021	941,579	144,367	2,781,967	1946	3,997,848	1,830,017	562,233	6,390,098
1933	1,859,049	937,313	182,988	2,979,350	1947	4,280,000	2,030,000	699,000	7,009,000

Source—Dominion Bureau of Statistics except for the last year which is estimated by Daily Mill Stock Reporter.

CANADA'S PULP EXPORTS SINCE 1921 AND ESTIMATED VALUE

Year	Tons	Value
1947	1,697,206	\$177,802,612
1946	1,419,044	114,020,659
1945	1,434,523	106,054,917
1944	1,408,075	101,563,024
1943	1,556,727	100,015,094
1942	1,510,727	95,266,873
1941	1,411,720	85,897,736
1940	1,068,490	60,930,149
1939	705,515	31,000,602
1938	554,034	27,730,738
1937	870,711	41,815,731
1936	754,489	31,246,695
1935	662,468	27,625,730
1934	605,635	25,444,844
1933	608,509	23,354,637
1932	452,292	18,930,065
1931	622,531	30,056,643
1930	760,172	39,059,979
1929	835,709	43,577,021
1928	863,806	45,614,323
1927	879,155	46,996,011
1926	1,003,081	52,077,122
1925	959,671	47,931,905
1924	781,978	40,242,972
1923	875,358	37,027,496
1922	818,246	41,037,849
1921	527,222	33,133,675

Source: Canadian Dominion Bureau of Statistics.
Last year estimated by Daily Mill Stock Reporter.

output of pulp of all classes was almost six times the total amount of wood pulp of all grades imported into the United States during 1947, put at 2,303,241 short tons by the U. S. Department of Commerce. In other words, 83.9 per cent of the available pulp supply last year was of domestic origin, with only 16.1 per cent obtained from outside sources—Canada, Newfoundland, Sweden and Finland mainly.

U. S. Pulp Imports

In a recent report issued in wood pulp imports by the American Paper & Pulp Assn., an interesting record is revealed regarding the trend since the war in European shipments to this country:

	From Sweden	From Finland	All Europe
June-Dec. '45	672,261		672,261
1946	445,124	115,220	560,344
1947	555,215	223,973	793,693
1st 2 Mos. 1948	138,086	35,335	175,503

CANADIAN WOODPULP PRODUCTION BY PROVINCES

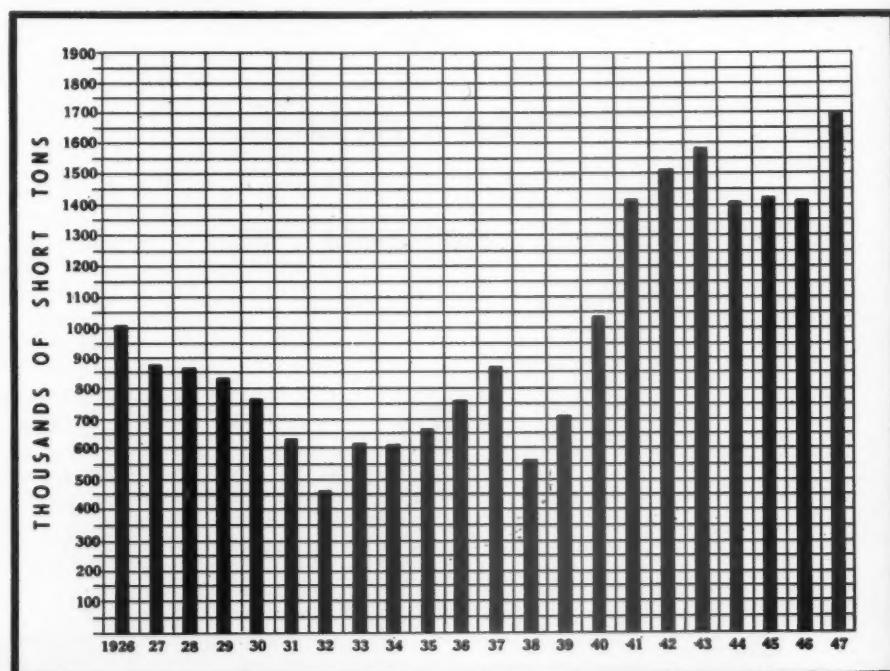
(Quantity in Tons—Value in Dollars)

Years	Quebec	Ontario	British Columbia	Other Provinces	TOTAL
1945 Tons	2,887,176	1,468,682	520,571	724,385	5,600,841
1945 Value	\$114,197,036	\$62,596,260	\$21,998,381	\$33,081,445	\$231,873,122
1946 Tons*	3,460,853	1,834,975	520,779	795,803	6,612,410
1946 Value*	\$140,930,891	\$84,049,038	\$24,216,820	\$38,427,478	\$287,624,227

*Latest figures available.

(Statistics on U. S. Production of Pulp by States will not be available until later this year, according to U. S. Dept. of Commerce.)

Pulp Exports from Canada



A total of 4,928 tons came from Russia in 1947, but there was none from that country in any of the other periods shown above.

Sweden was, for many years, the biggest exporter of wood pulp, and as late as 1939 exported close to two and a half million tons, of which the United States received a large share. If for some reason or another, Sweden cannot compete in this market in the future when competi-

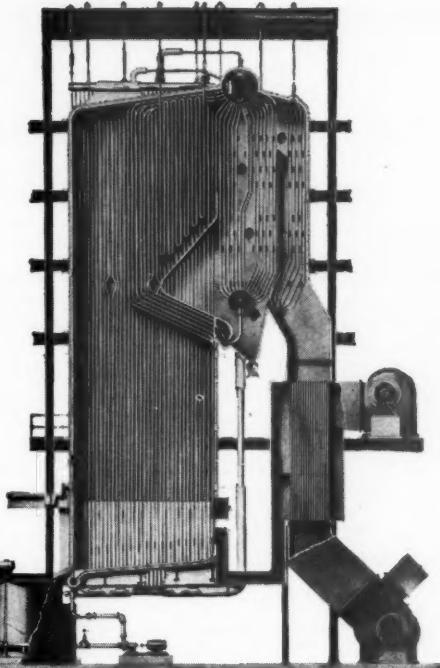
tion becomes more normal, it is reasonable to assume that she will be obliged to readjust her pulp distribution and perhaps find it necessary to reduce shipments to the American market.

Sweden's output of chemical pulp in 1947 was below 2,200,000 tons, or about 5% more than in 1946, according to preliminary estimates published by the Swedish Wood Pulp Journal.

The stocks of chemical pulp for sale



new 350-ton Recovery Units



Typical design of latest B&W-Tomlinson Recovery Unit. Ability to handle wide variation in black liquor concentration, with high chemical and heat recovery, are among its operating features.



Largest capacity black liquor recovery units so far developed are the two B&W-Tomlinson units recently ordered for use on southern kraft. These units each have a capacity of 350 tons per day and will each produce approximately 154,000 lb. of steam per hour. Selection of these B&W-Tomlinson units was heavily influenced by the satisfactory performance of units recently placed in service at other plants. Results there have thoroughly demonstrated their high degree of reliability, continuity of service and maintenance economy resulting from progressive improvements, including elimination of routine hand lancing.

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THE BABCOCK & WILCOX CO.
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WORKS: ALLIANCE AND BARBERTON, O.; AUGUSTA, GA.

1947 Regional Percentages of U. S. Wood Pulp Production

Mid-Atlantic	Ground					Total*
	Sulfite	Kraft	wood	Soda	Total	
Region	20%	2%	33%	30%	13%	
New England	11 1/2		16	33	8	
Lake States	24	6	19	12**	13	
South		83	16	25	48	
West Coast	44 1/4***	9	16	—	18	
Total	100%	100%	100%	100%	100%	

*Exclusive of defibrated and exploded wood pulp.

**Includes one West Coast mill.

***Includes one Southern mill.

went down during the year to about 165,000 tons, which means a reduction of some 70,000 tons as against 1946. Deliveries to the home market of paper cellulose and dissolving pulp totalled 210,000 and 220,000 tons respectively, which was considerably above normal quantities, while exports of various kinds of chemical pulp were only slightly larger than in 1946, when they amounted to about 1,540,000 tons. Detailed figures of shipments to different countries have not yet been published; Swedish exports to North America are, however, estimated at some 530,000 tons.

The shortage of electric power has hampered Swedish production considerably, especially in the mechanical pulp mills, but the rain and snow fallen recently over large parts of the country will, it is hoped, improve the power situation in due time.

One of the reasons pre-war record shipments of pulp from Sweden are never likely to again be duplicated is due to increased demand for paper in that country. Swedish consumption of paper has more than doubled since before the war. Here are a few available figures on consumption of paper in metric tons:

1935	205,000
1937	269,000
1942	360,000
1944	430,000
1946	530,500

From the standpoint of declared value, last year's pulp importations attained a new high far in excess of any other year. In fact, while almost doubling the value of the preceding year's imports, the 1947 value of pulp imports was more than double any other previous year with the exception of 1946, and was triple and even quadruple the annual values in years prior to the Second World War. This, of course, was a reflection of the sharp rises in market price levels of pulp during 1947.

Pulp imports into the U. S. last year reached a total of 2,303,241 short air dry tons, of a declared value of \$255,889,542, according to U. S. Department of Commerce official data. These imports constituted an impressive increase in volume of more than half a million tons or 508,572 tons and 28.3 per cent above a total of 1,794,669 short tons, valued at \$135,316,719, in 1946. The rise in declared value last year over the year before was much larger, or \$120,572,823 and 89.1 per cent.

While Canada increased its supply of

U. S. WOOD PULP PRODUCTION BY REGIONS—1947

(All Grades Except Defibrated and Exploded Wood Pulp)

	(In Tons of 2,000 Lbs.)					Total
Sulfite	562,166	323,133	662,809	1,244,196*	2,792,304	
Bleached	378,797	183,028	479,858	854,945*	1,896,628	
Unbleached	183,369	140,105	182,951	389,251	0	895,676
Sulfate		433,353		448,362	4,394,296	5,276,011
Bleached		0	150,535		86,763	861,292
Unbleached		46,395		236,423	361,599	3,533,004
Soda	150,259	163,160		58,561	123,960	495,940
Semicem./Other		0	0	64,919	358,221	423,140
Screenings and Off-Qu.		39,411		23,195	52,976	115,582
Groundwood	682,148	325,763	394,762	327,472	319,930	2,050,075
TOTAL	1,459,896	906,379	1,468,416	2,005,089	5,313,272	11,153,052

Source: As reported to U. S. Pulp Producers Association by 96% of the industry and estimated for 4%. *Includes one Southern mill.

U. S. PACIFIC COAST WOOD PULP PRODUCTION, 1926-1947

	Tons of 2,000 lbs. (except defibrated pulp)					
1923	299,596	1932	607,662	1940	1,839,263	
1924	309,433	1933	773,102	1941	1,994,150	
1925	322,594	1934	935,033	1942	1,968,658	
1926	378,005	1935	1,011,421	1943	1,521,531	
1927	449,218	1936	1,198,431	1944	1,644,531	
1928	562,514	1937	1,523,192	1945	1,591,789	
1929	780,494	1938	1,087,747	1946	1,694,959	
1930	815,089	1939	1,384,147	1947	2,005,089	
1931	817,548					

Source: U. S. Pulp Producers Assn.

United States in a year's time, and 1936 when total imports of mechanical and chemical pulp amounted to 2,277,829 short tons.

Prices of Swedish wood pulp for second quarter shipment to the United States have been advanced \$7.50 to \$10 per ton on principal grades, it was reported on Mar. 17. The new quotations announced by importers and sales representatives at New York mark the continued upward climb of Swedish pulp since export price controls in Sweden were lifted a year ago.

The latest increases bring the price of Swedish bleached sulphite up to \$185 to \$195 a ton, or \$10 higher; unbleached sulphite, \$155 to \$157, also \$10 higher; unbleached kraft, up \$7.50 to \$147.50 per ton, and bleached kraft up \$10 to \$185 to \$190 per ton. Prices are per short air dry ton, on dock at American Atlantic ports.

Swedish prices on April-June shipment wood pulp are thus raised to levels the lower fringes of which are uniform with prices on comparable grades of Finnish pulp to the United States in the same period. Also, the new price range on Swedish unbleached sulphite is narrowed considerably from that which prevailed on fourth quarter, 1947, and first quarter, 1948, shipments. Regional prices were farther apart than ever before and still are. Differences of \$25.00 to \$50.00 per ton between prices of United States and Canadian pulp and pulp from overseas, and in a few instances even more, prevailed during the year.

U. S. PULP STATISTICS PREPARED BY U. S. PULP PRODUCERS ASSOCIATION

All data in these tables are in tons of 2000 pounds, air dry weight.

Capacity—Based on reports to the U. S. Pulp Producers Association. Bleached capacity is not the maximum bleaching capacity in the United States, as capacity for those mills which produced unbleached pulp and did not utilize

all their bleaching facilities was allocated in proportion to their production of bleached and unbleached pulp.

Production—TOTAL: U. S. Bureau of the Census for all major grades. Other grades estimated from Census Bureau's combined data. MARKET: As reported to the United States Pulp

total
2,304
6,628
5,676
6,011
8,590
7,421
5,940
3,140
5,582
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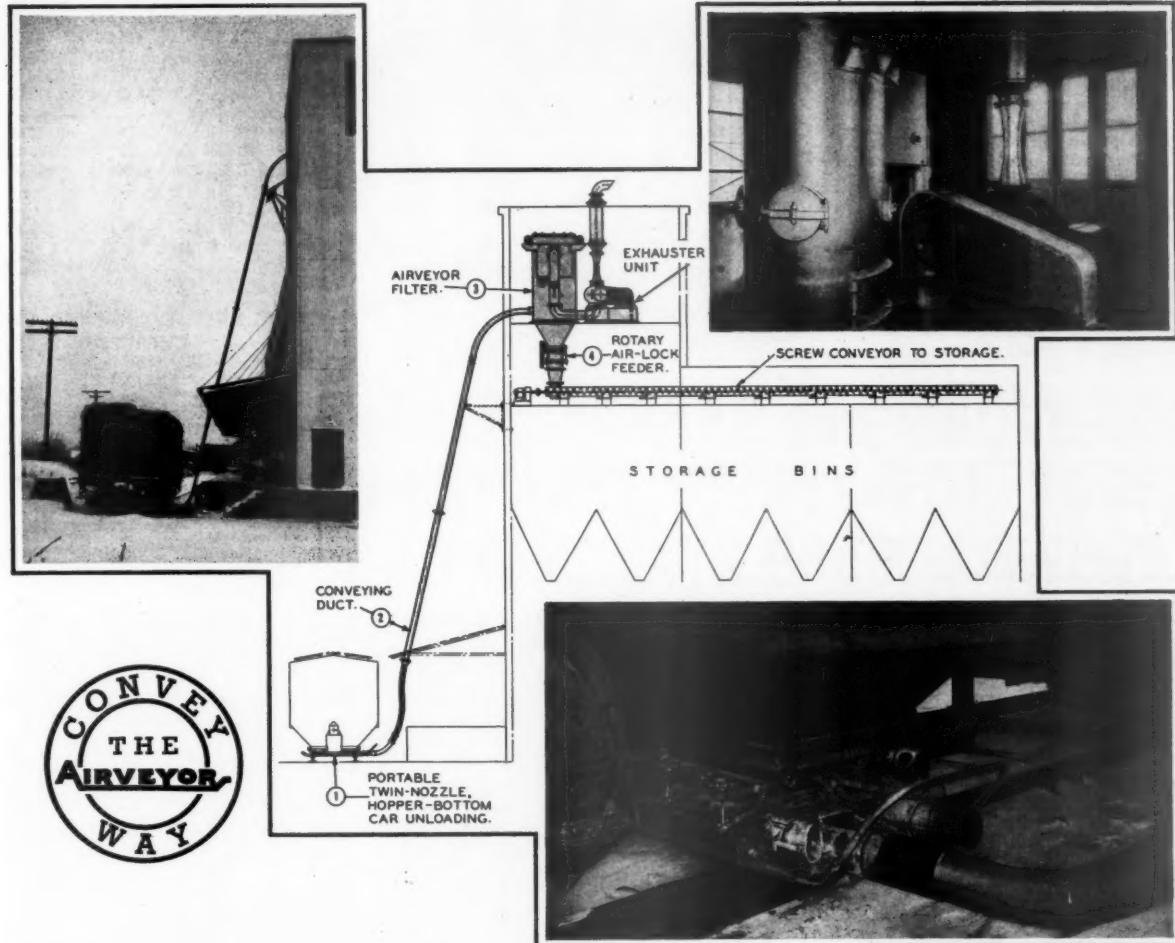
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1,150
8,658
1,531
1,531
1,789
1,959
5,089

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Unloading Starch From Hopper Cars in A Paper Mill

This paper manufacturer, using the Airveyor, saves the difference in price by purchasing in bulk instead of bags; also in cost of unloading and storing bagged material. Other pertinent advantages are—clean and dustless operation, rapid unloading, minimum of labor, and convenience in storing and reclaiming.

When unloading from hopper-bottom cars, a portable twin nozzle, mounted on a skid base is used. This device is placed underneath the car, across and resting on the tracks, and attachment made to car hoppers through a flexible canvas connection by the use of quick-detachable clamps. There is no dust or loss of material, since the car slide gates are not opened until attachment is made and the Airveyor system placed in operation. The same flexible hose connection to the permanent conveying duct can also be used for unloading from box cars by the use of a portable nozzle.

The process of unloading and conveying is as follows: Material flows from car into the portable-twin nozzle (1), underneath the hopper-bottom car; is conveyed through the duct (2) to the Airveyor filter (3); and discharged through the Fuller Rotary

Air-lock Feeder (4), for delivery to the screw conveyor distributing to storage bins. This Airveyor system unloads from cars at the rate of $7\frac{1}{2}$ tons an hour.

A second Airveyor system is also installed in the same plant for unloading coating clays.

It is possible you may have a material-handling problem which can be solved by the use of the Airveyor. Why not have a Fuller engineer make a survey? Chances are, we can help you, the same as we have done for many others.

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Producers Association for all grades except de-fibrated. Defibrated data estimated from Census data.

Imports—TOTAL: U. S. Bureau of the Census except for bleached, semibleached and unbleached sulfate, which have been estimated from the Census Bureau's total sulfate imports. MARKET: Estimates by the U. S. Pulp Producers Association, based on total imports minus receipts of "own pulp" from Canada as reported by the Bureau of the Census.

Exports—United States Bureau of the Census. **New Supply**—Production plus Imports minus Exports.

Consumption in Non-Paper—Estimates by the U. S. Pulp Producers Association for pulp consumed by producers of rayon, cellophane, etc.

Consumption in Paper & Board Mills and Inventories at Pulp, Pa. & Board Mills—TOTAL: U. S. Bureau of the Census for all major grades. Other grades estimated from the Census Bureau's combined totals. MARKET: Estimates by the U. S. Pulp Producers Association based on Bureau of the Census data. Some pulp reported to Census Bureau as "Purchased Pulp" is believed to have been pulp obtained from mills obligated to make such shipments by reason of their financial connections. Such pulp is not considered MARKET pulp in this booklet. This explains the differences between Census data and these estimates.

Inventories Other Mills & Elsewhere—Estimates by the U. S. Pulp Producers Association of pulp stocks at non-paper mills, in transit or on docks.

TOTAL WOOD PULP, ALL GRADES

	1946	1947	% Change
Capacity	12,130,164	12,789,111	+ 5
Production	10,606,527	11,951,548	+ 13
Imports	1,805,418	2,332,612	+ 29
Exports	39,361	130,096	+ 231
New Supply	12,372,584	14,150,222	+ 14
Consumption	12,565,000	13,872,222	+ 10
In Paper & Board	12,092,093	13,325,974	+ 10
In Non-Paper	472,907	546,248	+ 16
Inventory Dec. 31	557,000	835,000	+ 50

At Pulp, Pa. & Bd.	Mills	1946	1947	% Change
Ed. Mills		489,928	710,456	+ 45
Other mills & elsewhere		67,072	124,544	+ 86

MARKET WOOD PULP, ALL GRADES

	1946	1947	% Change
Production	1,330,000	1,502,594	+ 13
Imports	1,414,982	1,882,125	+ 33
Exports	39,361	130,096	+ 231
New Supply	2,705,621	3,254,623	+ 20
Consumption	2,910,000	3,000,268	+ 3
In Paper & Board	2,456,612	2,483,520	+ 1
In Non-Paper	453,388	516,748	+ 14
Inventory Dec. 31	437,244	691,599	+ 58

At Pulp, Pa. & Bd.	Mills	1946	1947	% Change
Mills		370,172	567,055	+ 53
Other mills & elsewhere		67,072	124,544	+ 86

TOTAL SULFITE

	1946	1947	% Change	
Capacity	2,907,724	2,891,942	- 1	
Production	2,476,468	2,800,138	+ 13	
Imports	1,043,416	1,267,796	+ 22	
Exports	32,563	107,792	+ 231	
New Supply	3,487,321	3,960,142	+ 14	
Consumption	3,600,000	3,782,271	+ 5	
In Paper & Board	3,144,434	3,261,579	+ 4	
In Non-Paper	455,566	520,692	+ 14	
Inventory Dec. 31	299,129	477,000	+ 60	
At Pulp, Pa. & Bd.	Mills	232,057	369,331	+ 59
Other mills & elsewhere		67,072	107,669	+ 61

MARKET SULFITE

	1946	1947	% Change
Production	962,456	1,098,539	+ 14
Imports	860,459	1,088,687	+ 27
Exports	32,563	107,792	+ 231
New Supply	1,790,352	2,079,434	+ 16
Consumption	1,910,118	1,920,919	+ 1
In Paper & Board	1,457,268	1,404,804	- 4
In Non-Paper	452,850	516,115	+ 14
Inventory Dec. 31	260,234	418,749	+ 61

MARKET BLEACHED SULFITE

	1946	1947	% Change
Production	793,197	884,640	+ 12
Imports	342,332	441,108	+ 29
Exports	15,692	53,935	+ 244
New Supply	1,119,837	1,271,813	+ 14
Consumption	1,159,099	1,204,096	+ 4
In Paper & Board	706,249	687,981	- 3
In Non-Paper	452,850	516,115	+ 14
Inventory Dec. 31	158,738	226,455	+ 43

TOTAL PAPER GRADES OF BLEACHED SULFITE

	1946	1947	% Change		
Production	1,393,603	1,495,127	+ 7		
Imports	222,653	288,552	+ 30		
Exports	7,201	43,546	+ 505		
New Supply	1,609,055	1,740,133	+ 8		
Consumption	In Paper & Board	1,628,256	1,686,358	+ 4	
Inventory Dec. 31	At Pulp, Pa. & Bd.	Mills	100,799	154,574	+ 53

MARKET PAPER GRADES OF BLEACHED SULFITE

	1946	1947	% Change		
Production	495,134	479,338	- 3		
Imports	140,140	192,579	+ 37		
Exports	7,201	43,546	+ 505		
New Supply	628,073	628,371	0		
Consumption	In Paper & Board	655,362	579,922	- 12	
Inventory Dec. 31	At Pulp, Pa. & Bd.	Mills	85,580	134,029	+ 57

TOTAL UNBLEACHED SULFITE

	1946	1947	% Change	
Capacity	953,812	932,534	- 3	
Production	784,391	896,315	+ 14	
Imports	618,571	730,715	+ 18	
Exports	16,871	53,857	+ 219	
New Supply	1,386,091	1,573,173	+ 14	
Consumption	1,467,596	1,468,345	0	
In Paper & Board	1,464,880	1,463,768	0	
In Non-Paper	2,716	4,577	+ 69	
Inventory Dec. 31	125,172	230,000	+ 84	
At Pulp, Pa. & Bd.	Mills	125,172	206,111	+ 65
Other mills & elsewhere		0	23,889	

MARKET UNBLEACHED SULFITE

	1946	1947	% Change	
Production	169,259	213,899	+ 26	
Imports	518,127	647,579	+ 25	
Exports	16,871	53,857	+ 219	
New Supply	670,515	807,621	+ 20	
Consumption	In Paper & Board	751,019	716,823	- 5
Inventory Dec. 31	101,496	192,294	+ 89	
At Pulp, Pa. & Bd.	Mills	101,496	168,405	+ 66
Other mills & elsewhere		0	23,889	

TOTAL BLEACHED SULFITE

	1946	1947	% Change	
Capacity	1,953,912	1,959,408	0	
Production	1,692,077	1,903,823	+ 13	
Imports	424,845	537,081	+ 26	
Exports	15,692	53,935	+ 244	
New Supply	2,101,230	2,386,969	+ 14	
Consumption	2,132,404	2,313,926	+ 9	
In Paper & Board	1,679,554	1,797,811	+ 7	
In Non-Paper	452,850	516,115	+ 14	
Inventory Dec. 31	173,957	247,000	+ 42	
At Pulp, Pa. & Bd.	Mills	106,885	163,220	+ 53
Other mills & elsewhere		67,072	83,780	+ 25

TOTAL DISSOLVING AND SPECIAL CHEMICAL

	1946	1947	% Change	
Production	298,474	408,696	+ 37	
Imports	202,192	248,529	+ 23	
Exports	8,491	10,389	+ 22	
New Supply	492,175	646,836	+ 31	
Consumption	504,148	627,568	+ 24	
In Paper & Board	51,298	111,453	+ 117	
In Non-Paper	452,850	516,115	+ 14	
Inventory Dec. 31	73,158	92,426	+ 26	
At Pulp, Pa. & Bd.	Mills	6,086	8,646	+ 42
Other mills & elsewhere		67,072	83,780	+ 25

MARKET DISSOLVING AND SPECIAL CHEMICAL

	1946	1947	% Change	
Production	298,063	405,302	+ 36	
Imports	202,192	248,529	+ 23	
Exports	8,491	10,389	+ 22	
New Supply	491,764	643,442	+ 31	
Consumption	503,737	624,174	+ 24	
In Paper & Board	50,887	108,059	+ 112	
In Non-Paper	452,850	516,115	+ 14	
Inventory Dec. 31	73,158	92,426	+ 26	
At Pulp, Pa. & Bd.	Mills	6,086	8,646	+ 42
Other mills & elsewhere		67,072	83,780	+ 25

TOTAL GROUNDWOOD

	1946	1947	% Change	
Capacity	2,330,260	2,446,116	+ 5	
Production	1,951,456	2,052,658	+ 5	
Imports	250,175	308,946	+ 23	
Exports	0	0	0	
New Supply	2,201,631	2,361,604	+ 7	
Consumption	2,201,119	2,353,349	+ 7	
In Paper & Board	2,184,316	2,334,458	+ 7	
In Non-Paper	16,803	18,891	+ 12	
Inventory Dec. 31	55,745	64,000	+ 15	
At Pulp, Pa. & Bd.	Mills	55,745	62,539	+ 12
Other mills & elsewhere		0	1,461	

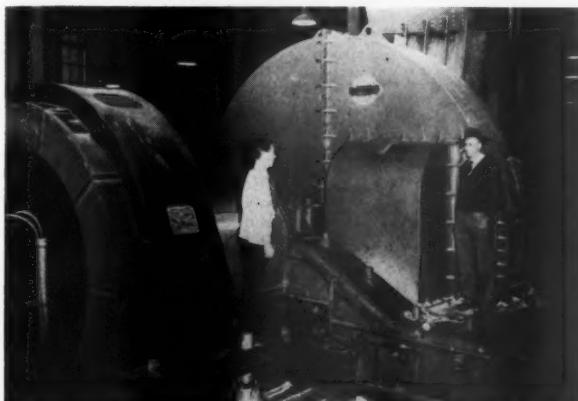
(Continued on page 120)



HYDRAULIC BARKER and WHOLE LOG CHIPPER MAKE MONEY FOR PUGET SOUND PULP, SAYS PRES. STEVENOT



(Above)—Bellingham-type Barker and, (below) 175" Whole-log Chipper at Puget Sound Pulp & Timber Company's plant at Bellingham.



Annual Report for '47 Shows Greater Savings (Timber and Labor) from this Combination.

"San Francisco, March 19—(AP)

President F. G. Stevenot attributed the year's record showing to:

Savings accomplished by the hydraulic barker and whole log chipper"

(Ed. note—Built by SUMNER*)

★ Many other SUMNER Whole-log Chippers, from 110" to 175" disc-diameters in Pacific Coast American and Canadian Pulp, Paper and Board Mills, are showing similar results. Comparable installations will soon be made in other plants, including Australia, along with a number of Bellingham-type Barker Units.

SUMNER
IRON WORKS
EVERETT, WASHINGTON

In Canada: CANADIAN SUMNER IRON WORKS, VANCOUVER, B.C.

TOTAL SULFATE

	1946	1947	% Change '46-'47
Capacity	5,377,079	5,495,495	+ 2
Production	4,588,016	5,265,892	+ 15
Imports	477,603	716,570	+ 50
Exports	5,441	19,818	+ 264
New Supply	5,060,178	5,962,644	+ 18
Consumption	5,141,216	5,879,590	+ 14
In Paper & Board	5,141,216	5,873,944	+ 14
In Non-Paper	0	5,646	
Inventory Dec. 31	176,053	259,107	+ 47
At Pulp, Pa. & Bd.			
Mills	176,053	243,693	+ 39
Other mills & elsewhere	0	15,414	

TOTAL UNBLEACHED SULFATE

	1946	1947	% Change '46-'47
Capacity	4,328,539	4,341,385	0
Production	3,685,857	4,166,704	+ 13
Imports	374,959	471,020	+ 26
Exports	4,663	17,332	+ 272
New Supply	4,056,153	4,620,392	+ 14
Consumption			
In Paper & Board	4,123,837	4,584,523	+ 11
Inventory Dec. 31			
At Pulp, Pa. & Bd.			
Mills	135,265	171,134	+ 27

MARKET UNBLEACHED SULFATE

	1946	1947	% Change '46-'47
Production	131,523	161,042	+ 23
Imports	307,896	409,847	+ 33
Exports	4,663	17,332	+ 272
New Supply	434,756	553,557	+ 27
Consumption			
In Paper & Board	512,348	513,562	0
Inventory Dec. 31			
At Pulp, Pa. & Bd.			
Mills	105,752	145,747	+ 38

TOTAL SODA

	1946	1947	% Change '46-'47
Capacity	493,879	504,801	+ 2
Production	476,211	503,189	+ 6
Imports	19,740	21,203	+ 7
Exports	145	569	+ 292
New Supply	495,806	523,823	+ 6
Consumption	492,369	518,886	+ 5
In Paper & Board	492,369	518,500	+ 5
In Non-Paper	0	386	
Inventory Dec. 31			
At Pulp, Pa. & Bd.			
Mills	16,792	21,729	+ 29

MARKET SODA

	1946	1947	% Change '46-'47
Production	85,891	74,033	- 14
Imports	19,671	21,203	+ 8
Exports	145	569	+ 292
New Supply	105,417	94,667	- 10
Consumption			
In Paper & Board	100,834	91,411	- 9
Inventory Dec. 31			
At Pulp, Pa. & Bd.			
Mills	12,921	16,177	+ 25

MARKET SULFATE

	1946	1947	% Change '46-'47
Production	180,247	211,107	+ 17
Imports	375,137	577,233	+ 54
Exports	5,441	19,818	+ 264
New Supply	549,943	768,522	+ 40
Consumption			
In Paper & Board	640,779	687,433	+ 7
Inventory Dec. 31	126,164	207,253	+ 64
At Pulp, Pa. & Bd.			
Mills	126,164	191,839	+ 52
Other mills & elsewhere	0	15,414	

TOTAL SCREENINGS/OFF-QUALITY

	1946	1947	% Change '46-'47
Capacity	*	74,029	
Production	178,478	105,569	- 41
Imports	14,484	14,255	- 2
Exports	1,212	1,917	+ 58
New Supply	191,750	117,907	- 39
Consumption	193,538	113,633	- 41
In Paper & Board	193,000	113,000	- 41
In Non-Paper	538	633	+ 18
Inventory Dec. 31			
At Pulp, Pa. & Bd.			
Mills	7,212	11,486	+ 59

*Included with other grades of pulp in 1946.

TOTAL BLEACHED SULFATE

	1946	1947	% Change '46-'47
Capacity	881,840	945,546	+ 7
Production	749,822	908,016	+ 21
Imports	71,869	223,830	+ 211
Exports	778	2,486	+ 220
New Supply	820,913	1,129,360	+ 38
Consumption	833,231	1,084,763	+ 30
In Paper & Board	833,231	1,079,117	+ 30
In Non-Paper	0	5,646	
Inventory Dec. 31	36,316	80,913	+ 123
At Pulp, Pa. & Bd.			
Mills	36,316	65,499	+ 80
Other mills & elsewhere	0	15,414	

MARKET BLEACHED SULFATE

	1946	1947	% Change '46-'47
Production	47,129	47,423	+ 1
Imports	52,424	152,639	+ 191
Exports	778	2,486	+ 220
New Supply	98,775	197,576	+ 100
Consumption			
In Paper & Board	110,391	158,948	+ 44
Inventory Dec. 31	18,384	57,012	+ 210
At Pulp, Pa. & Bd.			
Mills	18,384	41,598	+ 126
Other mills & elsewhere	0	15,414	

TOTAL SEMIBLEACHED SULFATE

	1946	1947	% Change '46-'47
Capacity	166,700	208,564	+ 25
Production	152,337	191,172	+ 25
Imports	30,775	21,720	- 29
Exports	0	0	
New Supply	183,112	212,892	+ 16
Consumption			
In Paper & Board	184,148	210,304	+ 14
Inventory Dec. 31			
At Pulp, Pa. & Bd.			
Mills	4,472	7,060	+ 58

MARKET SEMIBLEACHED SULFATE

	1946	1947	% Change '46-'47
Production	1,595	2,642	+ 66
Imports	14,817	14,747	- 1
Exports	0	0	
New Supply	16,412	17,389	+ 6
Consumption			
In Paper & Board	18,040	14,923	- 17
Inventory Dec. 31			
At Pulp, Pa. & Bd.			
Mills	2,028	4,494	+ 122

TOTAL SEMICHEMICAL AND CHEMIFIBRE

	1946	1947	% Change '46-'47
Capacity	353,555	481,659	+ 36
Production	314,188	414,375	+ 32
Imports	0	0	
Exports	0	0	
New Supply	314,188	414,375	+ 32
Consumption	314,443	414,987	+ 32
Inventory Dec. 31			
At Pulp, Pa. & Bd.			
Mills	674	562	- 17

PACIFIC COAST PULP PRODUCTION

	1932	1933	1934	1935	1936	1937	1938	1939
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
Washington	420,529	583,770	709,380	775,722	895,797	1,184,390	836,959	1,107,318
Oregon and California	187,133	189,332	240,167	262,221	302,634	338,802	250,788	270,829
British Columbia	259,586	343,897	383,818	377,522	416,433	425,558	242,020	321,132
Total Pacific Coast	867,248	1,117,999	1,333,365	1,415,463	1,614,864	1,948,730	1,329,767	1,699,279
1940	1,941 [†]	1,942 [†]	1,942 [†]	1,943 [†]	1,944 [†]	1,945	1,946	1,947
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
Washington	1,443,121	1,473,671	1,572,841	1,153,177	1,236,374	1,265,436	1,332,940	1,507,684
Oregon and California	396,142	518,479	421,154	403,306	412,342	372,939	420,408	497,400
British Columbia	445,364	494,811	448,272	385,875	465,787	463,150	542,568	587,940
Total Pacific Coast	2,284,827	2,488,861	2,442,267	1,942,358	2,134,503	2,101,525	2,295,916	2,593,029

Sources for other years are U. S. Census Bureau and Dominion of Canada Bureau of Statistics, except that in most recent years, PULP & PAPER estimated division of U. S. Pulp Producers total for Pacific Coast states and British Columbia amount is from B. C. Forest Service.

[†]U. S. figures from War Production Board.

The ABC's of Casting Problems



A stands for Abrasion, which wears a casting until its effectiveness is gone. **B** stands for BTU's (heat) which oxidizes castings, destroys their physical properties. **C** is for Corrosion which eats away the casting until it fails in service.

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New Consumption Record BUT REGROWTH IS FAVORABLE

PRODUCTION and consumption of pulpwood in the United States exceeded all previous records in 1947. Production went up more than 1½ million cords from the previous record in 1946 to 18,586,000 cords and consumption was almost two million cords greater—19,735,000 cords.

While this was happening, with these figures about twice what they were in the late '30s and more than three times what they were in the early '30s, the U. S. Forest Service surveys indicate a substantial margin of growth over drain throughout the country as far as pulpwood species alone are concerned.

There is no doubt that with the doubling and trebling and even the quadrupling of pulpwood consumption in this country in the past 30 years that the possibilities for developing production of pulpwood as a crop by thousands of farmers and small woodlot owners has been only barely scratched. Figures on the timber resources published in this section indicate how true that statement is.

But that critical 10% of pulpwood from Canada, on which a number of northern mills are so dependent, is in a precarious position due to steps being taken in Canada to require its processing on the other side of the international boundary. Imports held up fairly well in 1947—2,060,000 cords which was the highest total since 1942—but the outlook is not very bright for those U. S. mills which have been using this wood.

Domestic pulpwood receipts and consumption in January and February of 1948 were continuing at about the same pace as in 1947.

Here are some interesting percentage figures. For 1947, U. S. wood pulp consumption was 10.8% higher than 1946 and 82% higher than in 1939. Inventories at the end of 1947 were 20.7% higher than in 1946 but only 2% higher than in 1939.

Generally, the pulpwood outlook in the United States is quite favorable. There is no doubt that if demand for products warranted, there would be a wood supply for more mills in the South and in the

Far West. The only significant problem, as previously suggested, is the curtailment of exports from Ontario to Lake States mills. Some of these mills have fairly good wood inventories for 1948. But by 1949 they will face serious curtailment unless the Ontario policy is modified in the near future, so that wood procurement planning for next season's forest operations can be gotten under way before long.

South Produces Over 8,800,000 Cords in 1947

Now that the South possesses—built or building—fifty per cent of the wood pulping capacity of the United States, and even this to be boosted some more if other regions do not equalize additional mill projects apparently to come, the forest situation becomes increasingly interesting.

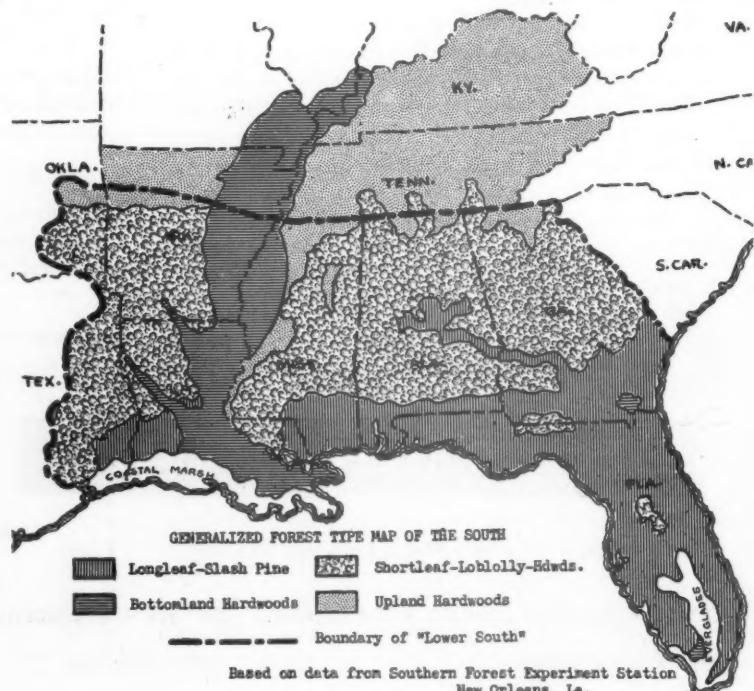
The past year was characterized by acquisition of forest lands by the mills whenever a suitable deal could be found. At the same time, the efforts of the Southern mills to bring about a greater appreciation by woods owners generally of the value of taking care of their forest were intensified. The work done by the mills to improve their own forest stands was stepped up.

The trend in this has been illustrated by the activities of the Southern Pulpwood Conservation Association, to which by far the bulk of pulp and paper mill forest ownership belongs.

The Association discontinued its "mechanical" woods operation activity. It employed more foresters, set them up in sections of the Southern region. Now, the Association will divide itself into geographical divisions. Each company located in a division will be represented on the sectional board of directors. The divisions in turn will be represented on a central board of directors.

The divisional set-up for the Association was created because its members want more frequent contact with one another on forestry and pulpwood conservation matters. They particularly want to discuss problems or methods of contiguous areas. As a further demonstration that the mills mean business, most of them have employed "forest conservation engineers" to work with other (the public) owners; advise them; even mark trees for selective cutting. One company operating eight large southern mills employed a forest conservation engineer to work in each state in which they buy or operate.

The Southern Forest Experiment Station placed the southern 1947 pulpwood crop as slightly above the 8,800,000 cords at which they set the 1946 figure. The companion station, also U. S. Forest Service for the Southeast, estimates the pulp-



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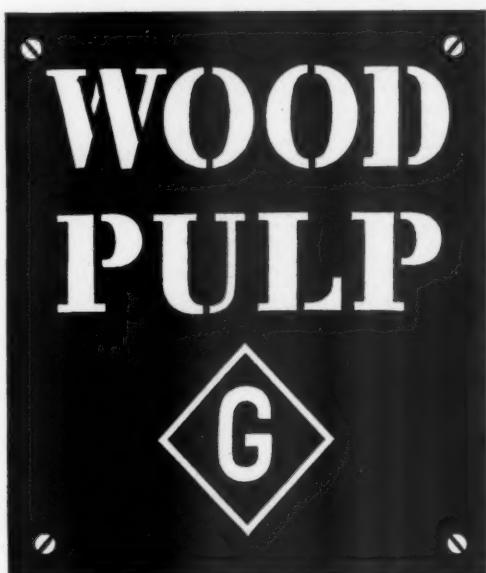
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U. S. PULPWOOD STATISTICS (1941-1947 INCLUSIVE)
Receipts, Imports, Consumption and Inventories

(In Thousands of Cords)

	1947 ¹	1946	1945	1944	1943	1942	1941
Receipts							
United States, total	20,645	18,978	16,983	16,998	15,293	17,140	16,458
Domestic	18,586	16,980	15,254	15,349	13,581	14,908	14,177
Imported	2,061	1,997	1,729	1,650	1,712	2,232	2,281
Northeast, total	4,110	3,650	3,389	3,039	2,954	3,399	3,486
Domestic	2,970	2,508	2,311	1,976	1,906	2,238	2,252
Imported	1,140	1,142	1,078	1,063	1,047	1,161	1,235
Appalachian, total	1,636	1,716	1,388	1,482	1,303	1,475	1,412
Domestic	1,613	1,684	1,365	1,472	1,302	1,448	1,378
Imported	23	32	23	10	2	27	34
South, total	8,264	7,909	7,153	7,090	6,505	6,622	6,400
Domestic	8,264	7,909	7,153	7,090	6,505	6,622	6,400
Imported							
Lakes States, total	2,908	2,919	2,456	2,637	1,969	2,796	2,241
Domestic	2,161	2,239	1,954	2,175	1,409	1,983	1,561
Imported	746	680	502	463	360	813	680
Pacific Northwest, total (2)	3,727	2,784	2,596	2,750	2,561	2,948	2,918
Domestic	3,572	2,642	2,470	2,636	2,458	2,616	2,585
Imported	156	142	126	114	103	231	332
Consumption, total	19,735	17,818	16,912	16,754	15,645	17,275	16,580
Northwest	3,740	3,466	3,245	3,159	3,265	3,530	3,515
Appalachian	1,685	1,501	1,444	1,490	1,442	1,498	1,420
South	8,419	7,516	7,208	7,153	6,342	6,804	6,227
Lake States	2,725	2,554	2,544	2,474	2,325	2,471	2,398
Pacific Northwest (2)	3,166	2,781	2,472	2,482	2,271	2,972	3,019
Inventories, total (3)	4,561	3,780	2,627	2,819	2,846	3,392	3,729
Northeast	1,440	1,063	869	700	820	1,119	1,218
Appalachian	372	422	206	279	280	423	439
South	291	526	145	218	293	126	334
Lake States	1,486	1,350	986	1,088	962	1,313	995
Pacific Northwest (2)	972	419	420	534	491	410	742

Detail may not add to totals because of rounding.

(1) Estimated.

(2) Converted 600 board feet equal 1 cord.

(3) End of year.

Source: Bureau of the Census, except 1941-1944 inclusive, which is by Forest Products Bureau, War Production Board.

U. S. PULPWOOD CONSUMPTION BY REGIONS
(1921-1940)

(In Thousands of Cords—and Percentage of Total)

	New England	Middle Atlantic	Lake States	Pacific Coast	Other States*	All		
	Th. cds.	Pct.	Th. cds.	Pct.	Th. cds.	Pct.	Th. cds.	Pct.
1921	1,345	29.5	1,107	24.3	1,218	26.7	342	7.5
1925	1,713	28.1	1,328	21.8	1,609	26.4	450	7.4
1930	1,513	21.1	1,116	15.5	1,679	23.3	1,351	18.8
1932	969	17.2	675	12.0	1,224	21.7	933	16.9
1935	1,096	14.4	788	10.3	1,454	19.1	1,693	22.2
1938	1,336	14.5	810	8.8	1,496	16.3	1,792	19.5
1939	1,660	15.3	891	8.2	1,658	15.4	2,335	21.6
1940	2,080	15.1	1,064	7.7	1,866	13.6	3,069	22.4
							5,661	41.2

*Chiefly Southern.

Source: Bureau of the Census: 1941-1944.

Domestic and Foreign Pulpwood Consumed in the United States
by Decades, 1860-1939

Decade	Total	Domestic		Imported		Per Cent of Total Imported
		1,000 cords	1,000 cords	1,000 cords	1,000 cords	
1860-69		15	15	—	—	—
1870-79		215	215	—	—	—
1880-89	3,120	3,120	—	—	—	—
1890-99	12,845	11,000	1,845	14	—	—
1900-09	30,758	24,601	6,157	20	—	—
1910-19	47,981	39,248	8,733	18	—	—
1920-29	62,277	50,780	11,497	18	—	—
1930-39	79,678	70,598	9,080	11	—	—
Total	236,889	199,577	37,312	16	—	—

Source: U. S. Forest Service.

wood crop for 1950 as over 11,000,000 cords. This consumption is for all wood pulping mills, including wallboard and roofing paper.

Private mill estimates have placed this figure higher for 1952.

The degree of interest being manifested

by southern mills in the development of their forest lands toward maximum tree production includes one operation that in 1947 extended \$250,000 for equipment, labor, and other cost factors for the establishment of an adequate network of fire breaks on its lands.

**Canada Increases Exports
Of Pulpwood in West**

While the province of Ontario has announced a program to gradually reduce virtually all exports of pulpwood to the U. S. to zero in ten years, British Columbia's pulpwood exports to northwest United States will be considerably greater this year than in 1947 as a result of the Canadian government's decision to raise the annual quota of such exports from 32,500,000 feet to 82,500,000 feet (65,000 to 165,000 cords). The saw log quota continues at 17,500,000 feet, so that the total of all species for export is an even 100,000,000 feet, exactly double what it was in 1947.

Agreement to increase pulpwood exports from British Columbia was reached at Ottawa following negotiations with Washington. While there is a growing market for pulp logs in British Columbia, the increase in exports was authorized in the interests of international cooperation and in recognition of similar aid from the United States in respect to different commodities.

The allowable log export from British Columbia is still considerably less than in pre-war years. During the past five years hemlock and balsam (pulp) logs exported from the province have averaged about 32,500,000 feet annually out of total exports ranging from 78,000,000 to more than 100,000,000 feet, but in 1942 logs used primarily for pulp were exported to the extent of 106,000,000 feet out of a total of 156,000,000 feet, and in 1941 the pulpwood export was close to 200,000,000 feet out of a total of 307,000,000 feet.

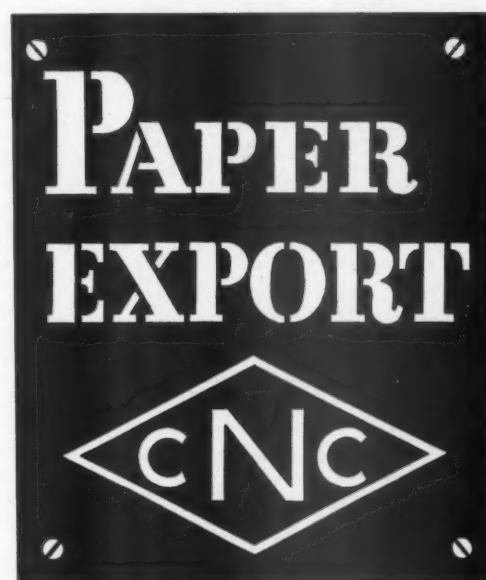
Chief Justice Gordon Sloan in his survey of forest resources of British Columbia strongly recommended rigid control over export of logs, and this appears to be the basic policy of the provincial government. As the pulp and paper manufacturing industry grows in British Columbia there will be progressively less pulpwood to export.

British Columbia's Pulpwood Exports to Washington State Mills
In F.B.M.—About 500 F.B.M. to One

	Cord
Year	Total
1941	191,532,734
1942	106,793,550
1943	29,723,223
1944	32,027,805
1945	32,624,170
1946	32,000,000
1947	32,500,000
1948	82,500,000

Similarly, in Ontario, the provincial government has taken steps which will mean virtual ending of pulpwood exports to the U. S. Middle Western pulp mills if it is carried out—and it seems likely to be.

With regard to Ontario pulpwood, it will be recalled that in the fall of 1947 the provincial government announced a policy to gradually reduce and eventually eliminate exports of pulpwood cut on Crown lands owned by the province of Ontario. The limitations on pulpwood exports to the United States were for 3, 4 or 10-



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CANADIAN PULPWOOD SPECIES — CURRENT ESTIMATED VOLUMES

(Provided for this issue of PULP & PAPER INDUSTRY by the Dominion Forest Service)
Material of Sawlog Sizes*

In Millions of Board Feet†

	Spruce	Balsam	Jack and Lodgepole Pine	Hemlock	Poplar	Total
Prince Edward Island	75	25		684	5	105
Nova Scotia	2,714	789		210	5	4,192
New Brunswick	3,102	1,202	248			4,762
Quebec	32,286	17,701	1,847	72	2,540	54,446
Ontario	27,901		11,914	793	3,292	43,900
Manitoba	778	5	71		1,610	2,464
Saskatchewan	2,960	30	620		2,420	6,030
Alberta	9,000	400	3,000		4,500	16,900
British Columbia	50,222	31,484	9,782	56,662		148,150
Total	129,038	51,636	27,482	58,421	14,372	280,949

Smaller Material‡

In Thousands of Cords

Prince Edward Island	600	80		5	10	695
Nova Scotia	6,702	15,639	26	236	840	23,463
New Brunswick	30,383	16,286	2,217	66	3,943	52,895
Quebec	513,397	287,747	40,048	1,048	22,079	864,319
Ontario	209,217	29,223	61,713	500	125,073	425,726
Manitoba	6,877	385	3,253		18,800	29,315
Saskatchewan	8,290	355	2,830		53,800	65,275
Alberta	30,000	1,550	90,000		90,000	231,550
British Columbia	84,995	69,936	313,201	20,460		488,592
Total	910,461	421,201	513,288	22,335	314,345	2,181,830

Total Pulpwood Species

Equivalent Volumes in Millions of Cubic Feet of Standing Timber
(Includes Sawlogs and Smaller Material)

Prince Edward Island	86,625	14,835		585	2,045	104,090
Nova Scotia	1,378,500	2,002,554	3,042	179,748	80,895	3,644,739
New Brunswick	4,234,149	2,168,700	313,701	53,712	374,581	7,144,847
Quebec	67,138,083	37,542,918	5,090,109	138,384	2,653,765	112,563,239
Ontario	30,588,708	3,419,091	9,829,587	232,167	12,602,883	56,672,436
Manitoba	974,991	46,140	396,150		2,138,590	3,555,871
Saskatchewan	1,618,170	48,105	466,890		5,640,980	7,774,145
Alberta	7,821,000	268,950	11,187,000		9,335,500	28,812,450
British Columbia	20,943,033	15,077,508	38,786,775	14,802,798		89,610,114
Total	134,783,259	60,588,801	66,073,254	15,407,394	33,029,243	309,881,951

*Probably only a minor portion of this wood will be used for pulp.

†Approx. 500 bd. ft. equals one cord. Very little of this, however, is cordwood or pulpwood. The total figure in this table, 280,949 million bd. ft. equals about 562 million cords.

‡Mostly pulpwood.

year periods depending on certain arrangements with individual United States companies. Current reports indicate that some additional time is being extended to these United States companies so as to cause less hardship while these firms can be seeking new sources of pulpwood supply.

It is understood that one of the reasons for Canada's concession of additional pulpwood logs from British Columbia at this time was the desire to reciprocate as far as possible in the exchange of essential materials.

The Canadian government was not unmindful of the Small Business Committee of Congress and its recent protest against the export of oil from the United States to Canada during the period of severe shortage in the eastern and middle western states.

Although this shortage was not so prevalent on the West Coast, British Columbia pulp and paper mills depend to a large extent on fuel oil from the United States, and last year consumed more than a million barrels, of which more than 800,000 barrels were imported direct to the mills,

WASHINGTON FIRST, MAINE SECOND, LOUISIANA THIRD IN TOTAL CONSUMPTION OF PULPWOOD IN UNITED STATES

Washington State again probably in 1947 was the only state consuming more than two million cords of wood in pulp mills.

New data on consumption of pulpwood by states for 1947 will not be available from the Department of Commerce until later this

year. But the relative standings of states and their totals for 1946 probably have not changed much in the past year.

Following are figures from the U. S. Bureau of census, as calculated in cords for regions and states:

	1945	1946		1945	1946
UNITED STATES, TOTAL	16,911,861	17,817,560		South Atlantic States	
New England States	2,158,075	2,300,973		Maryland, Virginia	4,677,858
Maine	1,704,386	1,859,174		North and South Carolina	4,833,691
New Hampshire	374,467	351,755		Georgia	963,667
Vermont, Mass., R. I.	79,222	90,044		Florida	1,037,282
Mid-Atlantic States	1,324,923	1,407,795		East South Central States	1,681,227
New York	777,930	842,757		Tennessee and Alabama	1,751,605
New Jersey	51,870	63,464		Mississippi	804,444
Pennsylvania	495,123	501,574		West South Central States	1,228,520
Middle West States	2,597,839	2,625,399		Louisiana	1,320,074
Ohio, Illinois, Iowa	81,281	117,223		Arkansas, Texas	1,332,522
Michigan	373,814	401,035		Pacific States	770,493
Wisconsin	1,611,434	1,611,068		Washington	549,581
Minnesota	531,310	496,073		Oregon	2,471,530
				California	552,064
					9,026
					11,288

CANADA'S AVERAGE ANNUAL CUT OF TIMBER AND ITS USES Based on the 10-year period, 1930-1939

	Million Cu. Ft.	%
For fuel	863.8	34.3
For sawmill products	797.6	31.7
For pulp and paper	706.3	28.0
For hewn ties, poles, logs, etc.	151.3	6.0
Total	2,519.0	100.0

Source: Dominion Forest Service.

the balance coming from British Columbia refiners which, however, get their crude supplies from the United States.

Pulp mill operators might have countered any argument from the United States respecting oil supply by pointing out that the oil was required for pulp and paper that eventually was marketed in the United States to meet the shortage there of all pulp products, but Ottawa evidently felt that it was preferable to deal with the situation in a conciliatory spirit and grant additional pulpwood exports rather than provide critics with support for their contention that Canada was not cooperating.

FAR WESTERN WOOD STATISTICS

Periodic pulpwood surveys in Washington, Oregon, Northern Idaho and Western Montana have been special features of PULP & PAPER Industry's Review Number each year. We are pleased to be able to present this information again in this issue—brought up-to-date by the regional Forest & Range Experimental Station officials.

However, it should be noted that Forest Service tables for Washington and Oregon on these pages do not include Douglas fir, of which there is about 60 billion bd. ft. in trees 4 inches and larger, d.m.b., available for cutting in the region. The Forest Service has left this species out in the preparation of the table for this Review Number, because Douglas fir has

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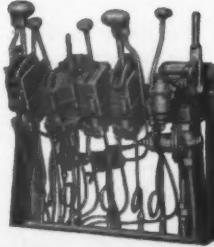
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been—and still is—the dominant lumber species.

But it is rapidly becoming a species of value to the pulp and paper industry. A tremendous use of fast-growing second growth Douglas fir is taking place in the pulp mills, thanks to the new ground-wood and kraft and bleaching processes. In some mills it will be the dominant pulpwood species.

This species already comprises 50% of raw material for the western kraft pulp and insulating board mills. Most of this is in shape of slabs from sawmills. Both large log and slab hydraulic barkers, being installed extensively in the West, are increasing the use of this species of wood.

Information is available for Douglas fir resources in the 1946 survey by the American Forestry Association financed by pulp, paper and lumber industries which is also published on page 132.

Of the available merchantable timber about one-third is second growth Douglas fir, now being used to a large extent by pulp mills with new kraft processes and bleaching techniques.

Total merchantable timber in the Douglas fir region is 439,070,594 board feet (equal to about 850 million cords). This includes also hemlock and spruce, traditional pulpwoods. If no more timber were to grow, that's enough for 60 years, according to AFA inventory.

Results of this inventory indicate an annual minimum sustained yield would total 13.1 billion board feet, if good utilization were practiced. If all forest acres could be brought to good growing capacity, Burt F. Kirkland, in charge of the survey, estimated a 20 billion board feet sustained yield annually (equal to about 40 million cords).

Forest Service Statistics

Accompanying tables which show the volume in thousands of cubic feet of pulp woods—available for cutting and other than Douglas fir—in Western Washington and Western Oregon have been revised as of January 1, 1947, thanks to the cooperation of the Pacific Northwest Forest and Range Experiment Station, U. S. Forest Service, Portland, Ore., based on forest surveys started in 1930. The results were first published in the Review Number of this journal in 1937, and revised in each Review Number since then. References may be made to the 1938 issue for greater detail as to the forest study.

Timber on municipal watersheds, state parks, national parks, and primitive areas in national forests, which because of laws or declared public policy is not available for commercial use, was not included.

Since completing the survey the experiment station staff has brought the inventory of the forests of the majority of the counties in the region up to date through field examination.

To date the reinventory has been completed for the following 31 counties: Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, King, Kitsap, Lewis, Mason, Pacific, Pierce, Skagit, Snohomish, Thurston, Wahkiakum, and Whatcom counties, Washington; and Benton, Clackamas,

Volume In Thousand Cubic Feet* of Pulpwood Other Than Douglas Fir In Western Washington and Western Oregon, Available for Cutting,² by Species Groups³

Adjusted to January 1, 1947

Species—	Western Oregon	Western Washington	Total
Western hemlock	5,280,000	14,879,000	20,159,000
Sitka spruce	757,000	1,057,000	1,814,000
Balsam firs ⁴	3,438,000	6,076,000	9,514,000
Mountain hemlock and Engelmann spruce	804,000	313,000	1,117,000
Black cottonwood	71,000	119,000	190,000
Total	10,350,000	22,444,000	32,794,000

Adjusted to January 1, 1946

Species—	Western Oregon	Western Washington	Total
Western hemlock	5,304,000	14,967,000	20,271,000
Sitka spruce	730,000	1,074,000	1,804,000
Balsam firs ⁴	3,456,000	6,085,000	9,541,000
Mountain hemlock and Engelmann spruce	804,000	313,000	1,117,000
Black cottonwood	72,000	128,000	200,000
Totals	10,366,000	22,567,000	32,933,000

Adjusted to January 1, 1944

Species—	Western Oregon	Western Washington	Total
Western hemlock	5,413,000	15,525,000	20,938,000
Sitka spruce	748,000	1,153,000	1,901,000
Balsam firs ⁴	3,425,000	6,011,000	9,436,000
Mt. hemlock, Engelmann spruce	804,000	313,000	1,117,000
Black cottonwood	72,000	128,000	200,000
Total	10,462,000	23,130,000	33,592,000

¹Includes all trees 4 inches and more, diameter breast high.

²Excludes timber reserved from cutting in municipal, state and federal ownership.

³Compiled by Pacific Northwest Forest and Range Experiment Station from Forest Survey data adjusted for cutting, depletion and growth.

⁴Includes Pacific silver fir, grand fir, noble fir, Shasta red fir, white fir, and alpine fir.

1936 — For All Ownerships

Species—	Western Oregon	Western Washington	Total
Western Hemlock	6,439,886	18,654,070	25,093,956
Sitka Spruce	1,145,377	1,625,924	2,771,301
Engelmann Spruce	46,643	9,259	55,902
White Fir	1,652,378	314,023	1,966,401
Amabilis Fir	763,712	6,567,606	7,331,318
Noble Fir	1,338,837	614,175	1,953,012
Alpine Fir	24,675	37,234	61,909
Mountain Hemlock	931,527	372,386	1,303,913
Total	12,343,035	28,194,677	40,537,712

Note—Other tables on this page for later years exclude government-owned reserves.

INLAND EMPIRE PULPWOOD* BY SPECIES AND SUBREGION

Data as of Jan. 1, 1945 (latest survey)

Subregion†	Engelmann Spruce	Hemlock	Balsam firs	Cottonwood and aspen	Total
Million Cubic Feet					
Northeastern Washington	32	41	53	4	130
North Idaho	608	386	1,697	10	2,701
Western Montana	828	54	242	53	1,177
Total	1,468	481	1,992	67	4,008

*The sound volume inside bark of trees larger than 5.0 inches d.b.h. from stump to 4- to 6-inch top diameter.

†Northeastern Washington consists of Ferry, Pend Oreille, Spokane and Stevens Counties; North Idaho is the portion north of the Salmon River; western Montana is the portion west of the Continental Divide.

Clatsop, Columbia, Coos, Jackson, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Washington and Yamhill counties, Oregon. It is planned to complete the reinventory of Douglas, Josephine, and Curry counties, Oregon, this year.

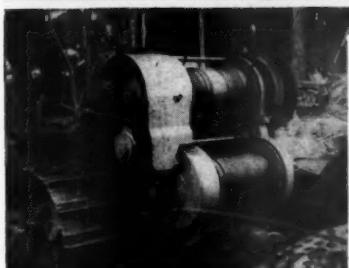
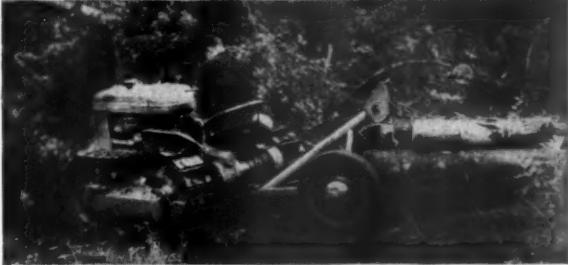
Volumes have been made current to Jan. 1, 1947, by adjusting the reinventories of the above-named counties and the original inventories for the other counties for depletion through cutting and increment through growth.

The cubic foot volume estimates give

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● **THE CARCO STANDARD SULKY AND "E" WINCH TEAM** for tractors to 45 HP arches larger loads of small logs. If traction is poor due to rain, a Winch-Sulky rig keeps you in the woods longer. To haul over a slick or bog, drop the load, go ahead to firm ground paying out line. Then winch up load and proceed.



● **A CARCO "R" HOIST** equipped tractor coupled to a portable spar can go into a heavy stand or rough terrain where arching is impractical and do a quick job of cold-decking. Many loggers are now producing pulpwood profits from otherwise waste trees by pre-logging with a mobile spar.



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CARCO tractor logging equipment and methods have been developed by loggers for loggers on *all* types of operations. REMEMBER—THERE IS A CARCO WINCH OR HOIST FOR NEARLY EVERY CRAWLER TRACTOR EVER MADE AND AN ARCH OR SULKY FOR EVERY TYPE OF TIMBER.

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**Volume of Pulpwoods, Other Than Douglas Fir, in Western Washington and Western Oregon Available for Cutting, by County
(In thousands of cubic feet)**

WASHINGTON

County—	1936	1944	1945	1946	1947
Clallam	3,732,187	2,741,000	2,672,000	2,641,000	2,610,000
Clark	34,248	33,000	32,000	32,000	29,000
Cowlitz	972,384	881,000	870,000	860,000	862,000
Grays Harbor	2,902,400	2,567,000	2,481,000	2,452,000	2,427,000
Island	8,934	9,000	9,000	9,000	9,000
Jefferson	3,456,382	2,237,000	2,215,000	2,204,000	2,207,000
King	2,166,924	2,051,000	2,131,000	2,109,000	2,100,000
Kitsap	23,295	19,000	19,000	18,000	19,000
Lewis	2,423,835	2,067,000	2,028,000	1,997,000	1,980,000
Mason	465,119	334,000	331,000	329,000	323,000
Pacific	1,908,220	1,832,000	1,753,000	1,727,000	1,684,000
Pierce	1,358,908	1,187,000	1,148,000	1,127,000	1,122,000
San Juan	11,461	11,000	11,000	11,000	12,000
Skagit	1,836,559	1,699,000	1,664,000	1,641,000	1,632,000
Skamania	1,825,243	1,831,000	1,845,000	1,837,000	1,846,000
Snohomish	2,266,424	2,176,000	2,159,000	2,148,000	2,139,000
Thurston	33,818	31,000	31,000	31,000	30,000
Wahkiakum	508,615	438,000	463,000	454,000	474,000
Whatcom	1,006,741	986,000	957,000	940,000	939,000
Total	26,961,697	23,130,000	22,819,000	22,567,000	22,444,000

OREGON

County—	1936	1944	1945	1946	1947
Benton	58,273	34,000	33,000	32,000	31,000
Clackamas	1,141,042	1,087,000	1,241,000	1,215,000	1,220,000
Clatsop	1,089,450	1,163,000	1,131,000	1,110,000	1,100,000
Columbia	48,139	36,000	37,000	36,000	36,000
Coos	434,653	310,000	389,000	387,000	392,000
Curry	185,953	187,000	192,000	192,000	193,000
Douglas	1,635,494	1,548,000	1,570,000	1,552,000	1,567,000
Hood River	424,900	292,000	340,000	340,000	338,000
Jackson	961,702	958,000	954,000	950,000	943,000
Josephine	110,289	107,000	107,000	107,000	105,000
Lane	2,812,664	1,330,000	1,286,000	1,282,000	1,272,000
Lincoln	666,705	471,000	438,000	421,000	417,000
Linn	1,465,262	1,417,000	1,251,000	1,225,000	1,214,000
Marion	528,369	505,000	505,000	461,000	463,000
Multnomah	227,155	30,000	132,000	133,000	132,000
Polk	220,277	163,000	156,000	154,000	142,000
Tillamook	984,874	761,000	732,000	709,000	725,000
Washington	84,693	42,000	41,000	40,000	41,000
Yamhill	22,774	21,000	20,000	20,000	19,000
Total	11,859,653	10,462,000	10,555,000	10,366,000	10,350,000

Source: Pacific Northwest Forest & Range Experiment Station. Includes all trees 4 inch and more in diameter, breast high.

After 1936 figures were adjusted for cutting depletion and growth and also for shifts of timber areas from reserved-for-cutting to available-for-cutting status. This accounts for the increase in Oregon in 1945 over 1944. The 1936 figures were published in the Review Number of this publication in 1936 and further explanation of those figures will be found in that issue.

the total sound wood content of the stem of the tree, exclusive of bark and limb wood. Decayed material is omitted, as well as the entire volume of all cull logs having more than two-thirds of the board foot content defective. No deduction was made for breakage in logging.

The ratio of timber in the various ownership classes remains about the same as in previous years.

Approximately 45% is privately owned; 43% on national forest lands, such as county, state, Indian reservations, etc.

Not all of the timber shown in the

tables will be available for pulp; considerable volumes of both western hemlock and Sitka spruce are utilized annually for lumber. In 1944 more than 600 hemlock logs and 300 million board feet of Sitka spruce logs, cut in the Douglas-fir region, were manufactured into lumber. However, it has been estimated that a total of nearly one-half million cords of slabs, edgings, and trimmings from sawmills is used for pulp annually.

A table on Inland Empire wood (page 128) — for eastern Washington, northern Idaho and western Montana — was supplied by the Rocky Mountain Forest & Range Experiment Station in Missoula, Mont. In a letter from M. B. Dickerman, chief, Division of Forest Economics, U. S. Forest Service, Missoula, Mont., PULP & PAPER is informed that statistics for Eastern Washington will be revised later this year.

Alaskan Timber

A great virgin area for future development of a North American pulp and paper industry is in Alaska. No mills exist there now and as this Review Number went to press the U. S. Forest Service had failed in efforts to sell timber areas for pulp mills because of outright sabotaging of its projects by a conspiracy between Department of Interior officials and lobbyists for Indian villages claiming "aboriginal rights" of ownership to the timber.

Private industry executives who have looked into the possibilities in Alaska state that good stands are scattered, although many stands are close to the water. Factors which had been known to delay any expansion in Alaska have been high cost of building a mill and mill town and the threatening policies of the U. S. Department of Interior in aggrandizing control over Alaskan resources.

Canadian Resources

Only two other countries in the world possess greater forested areas than Canada — Soviet Russia and Brazil.

In eastern Canada the drain on these resources has been well within the extent of natural regeneration of the forest and on the west coast where a long-term program for sustained yield is now being evolved there appears to be more timber suitable for pulpwood than for almost any other purpose.

Total land area of Canada is about 3,500,000 square miles. Of this, about 1,200,000 square miles are forested. Not all this land is productive, but the productive area measures 770,565 square miles — roughly equal to the combined area of the United Kingdom, France, Spain, Portugal, The Netherlands, Denmark and Sweden. This represents 22.2% or more than one-fifth of the total land area of Canada, but in the nine provinces of Canada 38% of the land area consists of productive forests. The forests of the Yukon and the Northwest Territories are at present only of local value.

Of the 770,565 square miles of productive forest, 430,000 square miles are accessible. In the productive forest area more than half is young growth; the re-

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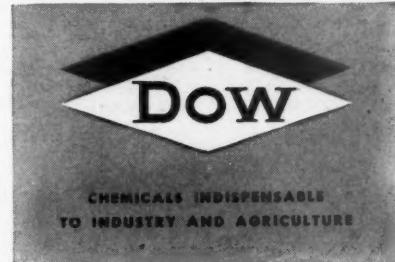
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AVAILABLE MERCHANTABLE TIMBER BY AGE CLASSES AND SPECIES M. B. F. SCRIBNER

(American Forestry Association Survey Completed in 1946)

	(1) Douglas Fir		(2)			(3)			(4)		(5)		(6)	
	Old Growth	Big Second Growth	Small Second Growth	Big Sitka Spruce	Small Sitka Spruce	Big Hemlock	Small Hemlock	True Firs	Cedars	Hardwoods	Miscellaneous	Total		
Puget Sound—East	10,980,000	3,629,000	1,036,000	175,780	3,760	18,841,000	2,519,000	11,715,330	6,715,330	326,921	1,232,143	56,639,264		
Olympic	7,856,000	982,000	845,000	3,651,000	167,000	18,876,000	2,890,000	7,167,000	6,024,547	290,355	145,610	49,694,437		
Columbia River—North	26,622,000	9,884,000	3,440,000	1,608,000	384,000	14,320,000	3,574,000	7,930,000	3,506,068	317,539	1,002,127	71,477,536		
Washington Total	45,458,000	9,884,000	5,321,000	5,434,780	554,760	53,037,000	8,783,000	26,812,000	15,710,775	934,815	2,379,880	177,811,237		
Columbia River—South	14,727,000	3,509,000	1,313,000	1,687,000	446,000	1,604,000	1,443,000	2,870,000	910,368	292,413	1,190,072	36,085,343		
Upper Will. Cent. Coast	55,700,000	25,207,000	4,568,000	128,000	100,000	7,956,000	837,000	3,010,000	1,948,856	611,152	2,444,785	102,775,644		
Umpqua	53,520,000	18,300,000	5,095,000	1,199,000	26,000	1,447,000	158,000	2,698,000	2,295,792	979,155	3,165,980	89,295,502		
Rogue	18,570,000	1,645,000	1,033,000	40,000	10,000	14,000	14,000	4,040,000	889,231	544,585	5,229,372	33,102,865		
Oregon Total	143,517,000	49,161,000	12,000,000	3,264,000	602,000	17,117,000	2,452,000	12,618,000	6,044,247	2,427,305	12,030,229	261,259,351		
Grand Total— Wash. and Oregon	188,975,000	63,656,000	17,330,000	8,698,000	1,156,000	70,154,000	11,235,000	39,430,000	20,859,000	3,362,000	14,409,000	439,070,588		

(1) Big Second Growth—26"-40" DBH
 Small Second Growth—16"-20" DBH
 (2) Big Sitka Spruce—Trees over 24" DBH
 Small Sitka Spruce—Trees 16"-24" DBH

(3) Big Hemlock—Trees over 20" DBH
 Small Hemlock—Trees 16"-20" DBH
 (4) Includes all cedars—Western red, Port
 Orford, Incense, etc.

(5) Hardwoods—Trees over 12" DBH
 (6) Miscellaneous—Pines, W. Larch, and Miscellaneous Softwoods

mainder is already of merchantable size.

Of the forest area now regarded as economically inaccessible it is probable that in future a considerable proportion will prove of commercial value, depending on the provisions of transportation facilities and rising values. In the nine provinces of Canada the productive forested areas alone are nearly four times the area at present devoted to farming.

Climate, topography and soil conditions determine the location.

As a means of awakening public interest in the importance of the forest industry, the western branch of the Canadian Pulp & Paper Association has launched a project providing for the presentation of seedling trees to primary pupils in British Columbia schools.

MAP ISSUED RECENTLY ON WORLD FOREST AREAS by American Paper & Pulp Assn. Note that except for small area in Brazil, all coniferous timber, principal material for pulp and paper, is in Northern Hemisphere. Mercator's projection of globe greatly exaggerates extreme northern areas, where coniferous timber is located. Transportation difficulties face use of timber in Hudson Bay area and Siberia. Government controls, maritime union difficulties, government-sponsored Indian claims to ownership and general high costs are serious problems facing any investors in Alaska.

Sources: Canada—Dominion Forest Service Statistical Record, 1946. U. S.—Basic Forest Statistics, U. S. Forest Service, July 1946. Russia—M. I. Saltykov, Soviet Minister of Forest Industries, article published in "Ogoniok" in late 1946. Scandinavia—Report to Canadian Pulp and Paper Assn. by Drs. Allan C. Hill and W. B. Campbell, Feb. 1946.

MEXICO TURNS ATTENTION To Its Pulpwood Resources

This year, for the first time, **PULP & PAPER** has extended its field surveys by editors into Mexico where considerable expansion of the pulp and paper industry has taken place. The construction of two new kraft pulp mills to use pine, plans for a third, and expansion of a fourth, as well as virtual doubling of the ground-wood production capacity in that country has brought Mexico's coniferous timber reserves into the spotlight.

There are several species of pine which

grow in abundance in three or four large areas of Mexico and generally they are highly suitable for pulpwood with unusually low resin content. They hold considerable promise for kraft processes.

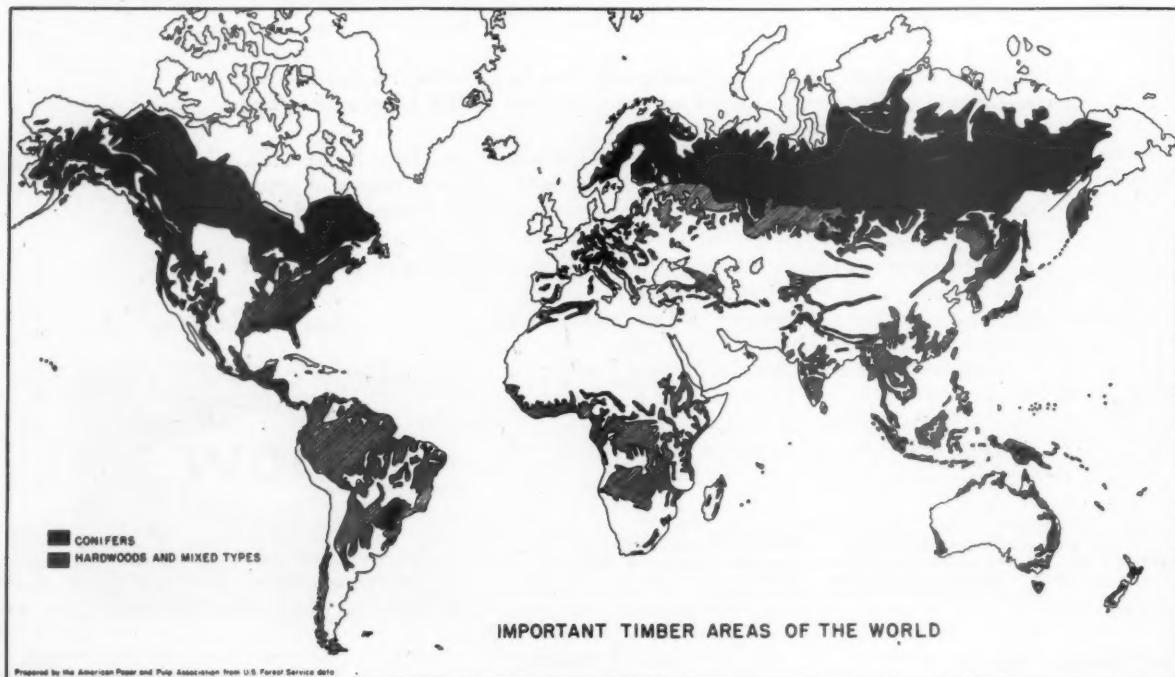
When Mexico was visited by a **PULP & PAPER** editor this spring, efforts were made to obtain statistics on timber resources at the Forestry Department of the government as well as from other sources, but apparently there just aren't any that can be considered official. Es-

Europe (other)—Food and Agricultural Organization of U. N. Aug. 1946.

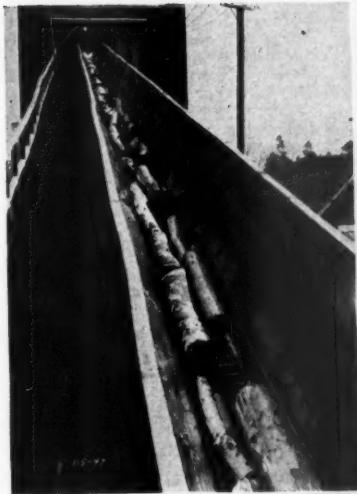
Data on timber areas and timber stands in northern areas:

	Forest Areas (Millions of Acres)	Timber Stands (Millions of Cu. Ft.)
Canada (accessible productive) ...	268	191,347 (a)
(inaccessible productive) ..	242	119,854 (a)
Total Canadian	510	311,201 (a)
U. S. (commercial forests).....	461	470,045 (b)
Russia (total including Siberia).....	2,471	1,590,000 (b)
Scandinavia (productive forests) ..	137	103,000 (a)
Europe (other than Russia and Scandinavia)	190	Not available

(a) Merchantable timber. (b) All timber.

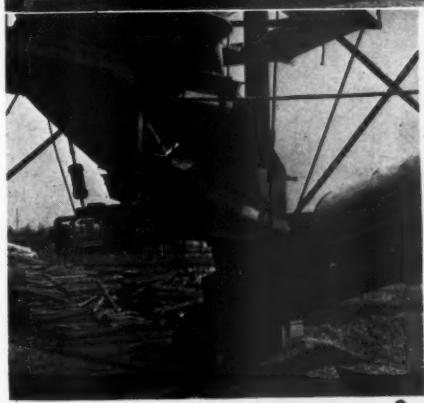


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Baltimore 2
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Chicago 2



timates have been made by the U. S. consular service, by Zon and Sparhawk in their "Forest Resources of the World" and others.

Cia. de las Fabricas de Papel de San Rafael, headed by Jose de la Macorra Jr., which makes sulfite and groundwood pulp and will be producing kraft this year, totaling around 150 tons daily, received notice from the government that it had been awarded exclusive cutting rights to 500,000 acres of timberlands in the vicinity of the mill, south of Mexico City, and extending into Michoacan. A **PULP & PAPER** editor visited the mill on the very day the notice arrived.

For the new 80-ton Atenquique kraft mill, an exclusive grant has been made for wood supply from a vast area 500 sq. mi (estimated as 3,000,000 cords) in Jalisco province where not a single pine can be cut unless it is sold to that mill, and foresters for the government estimate that there is a perpetual supply.

Most authorities agree that the forest areas of Durango and Chihuahua provinces are the most suitable for pulp development with the most extensive pine resources. Mills have been projected here but the main problem is lack of water.

A pine similar to the ash pine of Southern United States is the backbone of the new boom for kraft industries. But for many years a species of pine called "oyamel" has been used for groundwood and sulfite. The oyamel is similar to the spruce of the Pacific Northwest, but smaller and short-leaved.

The oyamel flourishes in altitudes of 8,000 to 12,000 ft., but the other pines which are now being used are quite com-

mon from 4,000 to 14,000 ft. Most of the suitable pulpwood are in rough high country and many roads must be built and considerable use of mechanized equipment will be necessary to develop these resources. Now, Mexico is just scratching the surface.

A new and strict forestry law was invoked just a few weeks before **PULP & PAPER'S** editor arrived in the country, and this was subject to wide discussion. Government foresters now mark every tree that is cut for sawmills or pulpwood, and return to the area to check on amounts cut. Development of tree nurseries by all operates and re-planting will be strictly enforced hereafter.

There are no data available on ownerships of timber in Mexico. The government owns very little, apparently, although strictly controlling cutting operations. There are still extensive private holdings, states own timber areas, but a very common type of ownership is the "ejido"—big timber tracts expropriated after the Revolution and given to groups of villagers or "agaristas" and now a communal or cooperative type of ownership.

Estimates of Mexico's coniferous forest stands range up to 5 or 6 million acres. Now virgin wood is still being cut generally, but pine will reproduce faster in Mexico probably than even in the South. Many trees cut for pulpwood are up to 200 ft. high and six ft. in diameter.

There is substantially more hardwood than pines in Mexico and mostly at lower elevations. Interesting estimates of the pine stands as developed by the U. S. Consular Service in 1939 follow:

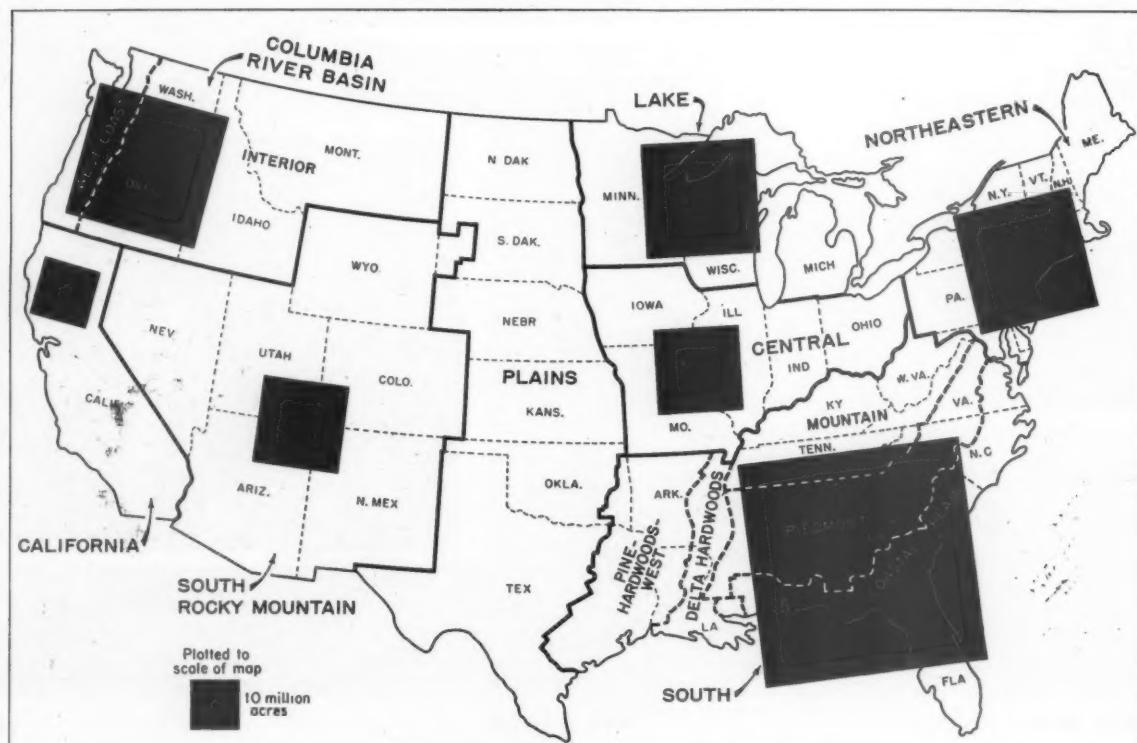
Mexico's Pine Resources

State	Thousands of Acres	Thousands of Bd. Ft.
Lower California	25.7	65,190
Coahuila	206.1	792,517
Chiapas	34.6	140,338
Chihuahua	1,238.7	2,879,574
Federal District	9.9	19,281
Durango	1,380.5	4,860,336
Guanajuato	17.3	37,786
Guerrero	22.2	205,633
Hidalgo	35.3	150,543
Jalisco	183.8	295,719
Mexico	232.0	1,008,170
Michoacan	400.8	1,799,000
Morelos	9.1	5,005
Nayarit	43.2	25,926
Nuevo Leon	172.5	530,416
Oaxaca	74.9	141,785
Puebla	100.8	362,568
San Luis Potosi	65.5	142,033
Sinaloa	31.1	212,625
Sonora	62.8	169,220
Tamaulipas	202.6	269,940
Tlaxcala	15.1	33,089
Veracruz	260.4	969,440
Zacatecas	44.0	14,867

How Pulpwood Started in Australia

Monterey pine seeds carried in mine tailings ballast from California to Australia subsequently sprouted. From this beginning there are now some 200,000 acres of Monterey pine in that country. Surprising as it has been this species growing in Australia has about four times the rate of growth as in California and three times the rate of Ponderosa pine introduced into Australia from this country. **THOUSANDS OF PORT ORFORD** cedar seedlings were Christmas presents given to Crown Zellerbach employees. One of the biggest presentations was at the Port Townsend mill where there were 10,000 of the seedlings given to employees.

COMPARATIVE SIZES OF COMMERCIAL FOREST AREAS IN UNITED STATES (Compiled by U. S. Forest Service)



ousands
Bd. Ft.
65,190
792,517
140,338
879,574
19,281
.860,336
37,788
205,633
150,543
295,719
.008,170
799,000
5,085
25,926
530,416
141,785
362,568
142,033
212,625
169,220
269,940
33,089
969,440
14,867

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The C-E Steam Generator, Type VU, may be said to carry the "seal of approval" of the pulp and paper industry. Many of the most prominent names in the paper field are numbered among its users. A representative sample of companies that have purchased VU Units appears in the panel at the right.

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Investigate before you purchase any new steam generating equipment and learn why so many pulp and paper companies prefer the VU Unit.

B-131

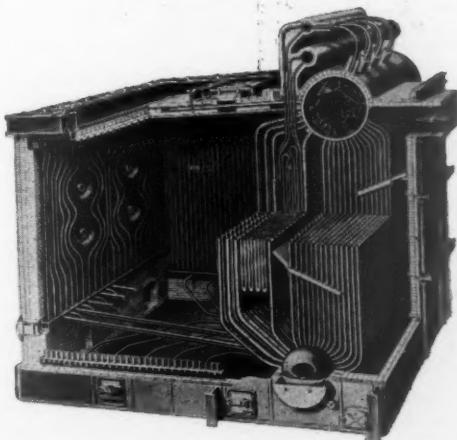


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Representative list of pulp and paper companies
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The Brown Company
Canadian International Paper Co.
Chemical Paper Mfg. Co.
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Fraser Companies, Ltd.
Hammermill Paper Company
Kalamazoo Vegetable Parchment Co.
Kimberly-Clark Corporation
Macon Kraft Corporation
Marathon Paper Mills of Canada, Ltd.
National Container Corporation
Nekoosa-Edwards Paper Co.
The Northwest Paper Company
St. Regis Paper Company
Scott Paper Company
Southern Paperboard Corp.
Southland Paper Mills, Inc.
S. D. Warren Company



U. S. FOREST SERVICE'S LATEST RESOURCES SURVEY

The latest Appraisal of U. S. Forest Resources was made in 1945 and 1946 by the U. S. Forest Service.

On this page is published some of the data developed by that survey. It will be noted that by 1944, drain (cutting, fires, disease, insects, etc.) and growth were practically balanced. In the pulpwood species, the growth probably far outstrips drain, because the Forest Service reported that drain was 50% greater than growth in sawtimber species.

The Forest Service "goal" is a growth

of 20 billion cu. ft., instead of less than 14 billion (1944), in order to permit an annual crop of 72 billion bd. ft. of sawtimber. It holds this can be achieved by 2020 A.D. by reducing sawtimber drain by 4 billion ft. for several decades and by intensive good management on 100 million acres and less intensive on 300 million of the 461 million acres available for commercial timber growing. Of this total, 57% is in hands of 4,200,000 owners who have less than 5,000 acres each. Only 4% of these practice good forestry, says the USFS. It visualizes demand annually for 20 million cords of pulpwood in 5 to 10 years, to make 24 million tons of paper. The 1947 cut was about 17 million cords.

U. S. COMMERCIAL TIMBER In Millions of Cu. Ft. in 1945 (By U. S. Forest Service)

	All Trees	5 in. D.B.H. or over	Pulpwood size*
New England:			
Connecticut	967	519	
Maine	15,046	6,809	
Massachusetts	2,194	1,089	
New Hampshire	3,378	1,563	
Rhode Island	120	78	
Vermont	2,021	1,254	
Mid-Atlantic:			
Delaware	441	171	
Maryland	1,859	926	
New Jersey	1,210	684	
New York	9,668	3,807	
Pennsylvania	9,570	4,224	
West Virginia	4,611	2,316	
Lake:			
Michigan	10,300	3,800	
Minnesota	5,900	2,800	
Wisconsin	7,000	2,900	
Central:			
Illinois	1,412	451	
Indiana	1,919	397	
Iowa	1,904	520	
Kentucky	6,826	3,822	
Missouri	6,041	4,243	
Ohio	2,890	603	
Plains:			
Kansas	1,391	911	
Nebraska	1,078	828	
North Dakota	465	355	
Oklahoma (West)	...	...
South Dakota (East)	630	450	
Texas (West)	159	112	
South Atlantic:			
North Carolina	14,729	5,312	
South Carolina	9,685	3,156	
Virginia	11,551	5,308	
Southeast:			
Alabama	13,620	6,208	
Florida	7,239	3,345	
Georgia	15,237	6,322	
Mississippi	12,131	4,992	
Tennessee	5,993	2,332	
West Gulf:			
Arkansas	15,187	6,845	
Louisiana	13,933	5,263	
Oklahoma (East)	1,303	648	
Texas (East)	10,266	4,309	
Pacific Coast:			
Oregon	85,213	16,917	
Washington	60,666	16,383	
California	44,600	3,350	
North Rocky Mountain:			
Idaho	14,024	4,055	
Montana	14,137	5,896	
South Dakota (West)	868	294	
Wyoming	4,321	2,050	
South Rocky Mountain:			
Arizona	2,924	468	
Colorado	9,617	3,744	
Nevada	100	36	
New Mexico	1,705	421	
Utah	1,096	275	
All States			
All States	470,045	153,561	

U. S. TIMBER STAND IN 1945 and percentage of desired growing stock to meet Forest Service objectives which it represents.

	Billion cu. ft.	Percent Growing Stock
New England	25	78%
Middle Atlantic	27	57%
Lake	23	66%
Central	21	40%
Plains	4	100%

	100	59%
South Atlantic	36	106%
Southeast	54	63%
West Gulf	41	69%

	131	73%
Pacific Northwest:		
D. fir subregion	117	107%
Pine subregion	29	97%

	146	105%
California	45	100%
North Rocky Mt.	33	79%
South Rocky Mt.	15	79%

	239	98%
UNITED STATES	470	79%

FOREST SERVICE GOAL

	Billion cu. ft.	1944
	Growth goal	growth
New England	1.14	.90
Middle Atlantic	1.64	1.40
Lake	1.15	.81
Central	1.73	1.44
Plains	.12	.12

	5.78	4.67
South Atlantic	2.14	1.76
Southeast	4.80	2.71
West Gulf	3.20	1.92

	10.14	6.39
Pacific Northwest:		
D. fir subregion	2.17	1.02
Pine subregion	.38	.22

	2.35	1.24
California	.64	.33
North Rocky Mt.	.65	.54
South Rocky Mt.	.24	.20

	4.08	2.31
West		

	20.00	13.37
United States		

VOLUME OF TIMBER ON COMMERCIAL FOREST LANDS OF UNITED STATES

As of 1945, According to Re-Appraisal by U. S. Forest Service

(In Millions of Cubic Feet—128 cu. ft. to one cord)

Region*	All trees over 5 in. D.B.H.				Trees too small for sawtimber, large enough for pulpwood—over 5 in. D.B.H.**	
	Total	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood
New England	24,626	11,318	13,308	11,312	4,667	6,645
Middle Atlantic	27,359	5,376	21,983	12,128	2,545	9,583
Lake	23,200	7,000	16,200	9,500	2,800	6,700
Central	20,992	1,479	19,513	10,036	933	9,103
Plains	3,723	269	3,454	2,656	179	2,477
North	99,900	25,442	74,458	45,632	11,124	34,508
South Atlantic	35,965	17,031	18,934	13,776	4,595	9,181
Southeast	54,220	23,841	30,379	23,199	8,013	15,186
West Gulf	40,689	17,460	23,229	17,065	5,953	11,112
South	130,874	58,332	72,542	54,040	18,561	35,479
Pacific Northwest						
Douglas fir sub-region	117,222	115,499	1,723	26,619	25,573	1,046
Pine sub-region	28,657	28,623	34	6,681	6,663	18
TOTAL	145,879	144,122	1,757	33,300	32,236	1,064
California	44,600	44,600	—	3,350	3,350	—
North Rocky Mountain	33,350	32,926	424	12,295	12,070	225
South Rocky Mountain	15,442	14,575	867	4,944	4,263	681
West	239,271	236,223	3,048	53,889	51,919	1,970
All regions	470,045	319,997	150,048	153,561	81,604	71,957

Volume does not include bark. Includes volume on land capable of producing timber of commercial quantity and quality and available now or prospectively for commercial use.

*See other table on page 106 for states included in regions.

**But may be saved for sawtimber. Up to 9-13 in. D.B.H. in East and South and up to 15 in. D.B.H. generally in West.

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World's Idle Capacity IS DOUBLE U. S. PRODUCTION!

NEWSPRINT manufacturing, as a business, was beginning to be able to hold its head up again in 1948 as a profitable enterprise, and there were some experienced observers who were convinced that its future outlook would be much more stable than it has been in the past. A few more machines probably will go into production in the United States and Canada, but there cannot be any appreciable increase. In the U. S., the down-

ward trend in newsprint production seems to have been finally halted, with increases planned at Hawley Pulp & Paper Co., Southland Paper Mills and with a new newsprint mill project in Alabama.

The prospect for an Alaska newsprint industry was virtually completely erased from the boards—for a long time to come. Politics—the Indian lobby in Washington, aided and abetted by the Interior Department in holding the threat of aboriginal

Indian claims to Alaskan resources over the Forest Service attempts to sell timber for a newsprint mill, had discouraged any private investment.

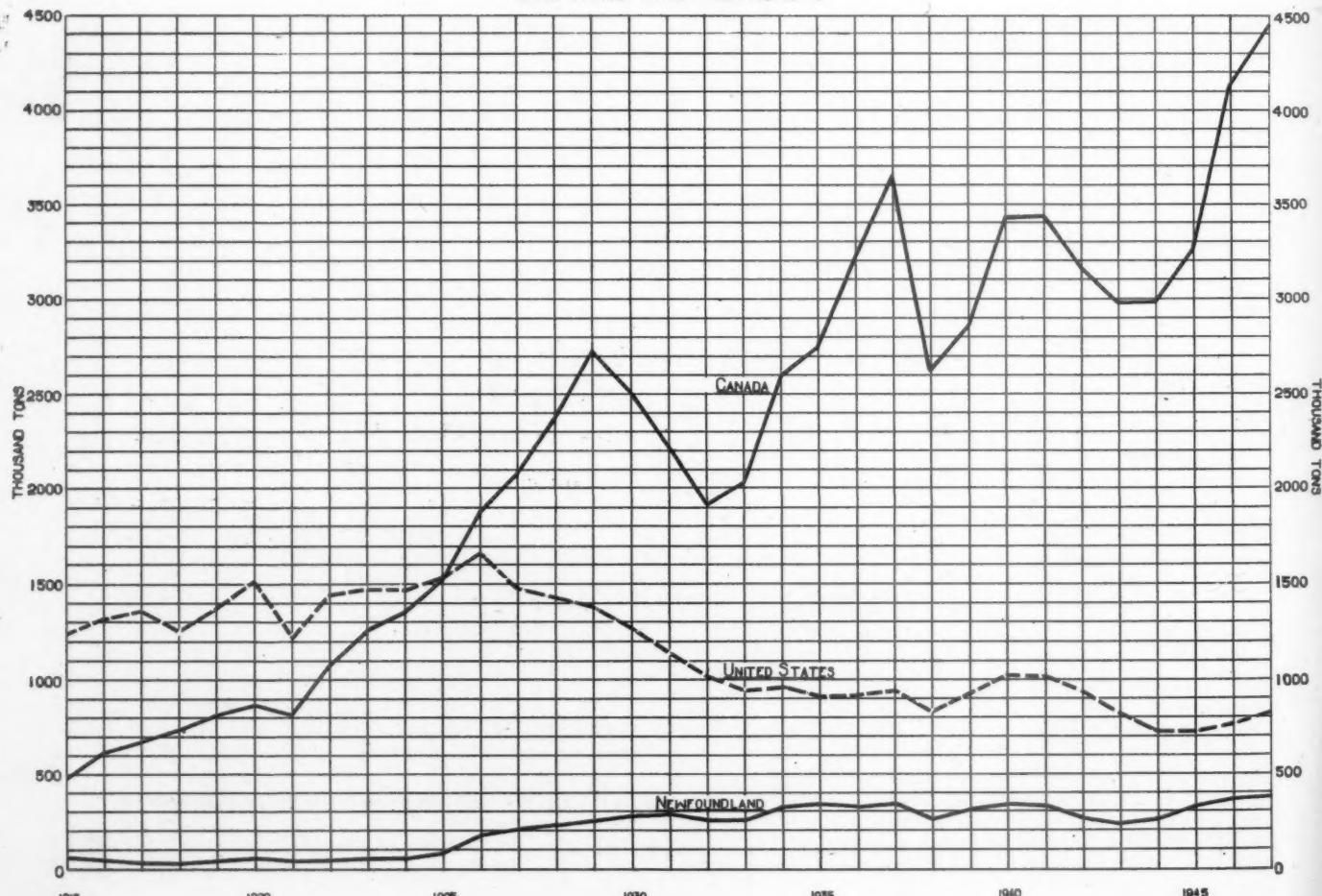
The Newsprint Association of Canada last fall compiled some interesting statistics on the world shortage of newsprint, which it calculated at 1,140,000 tons in 1947 and predicted would be 1,140,000 tons in 1948.

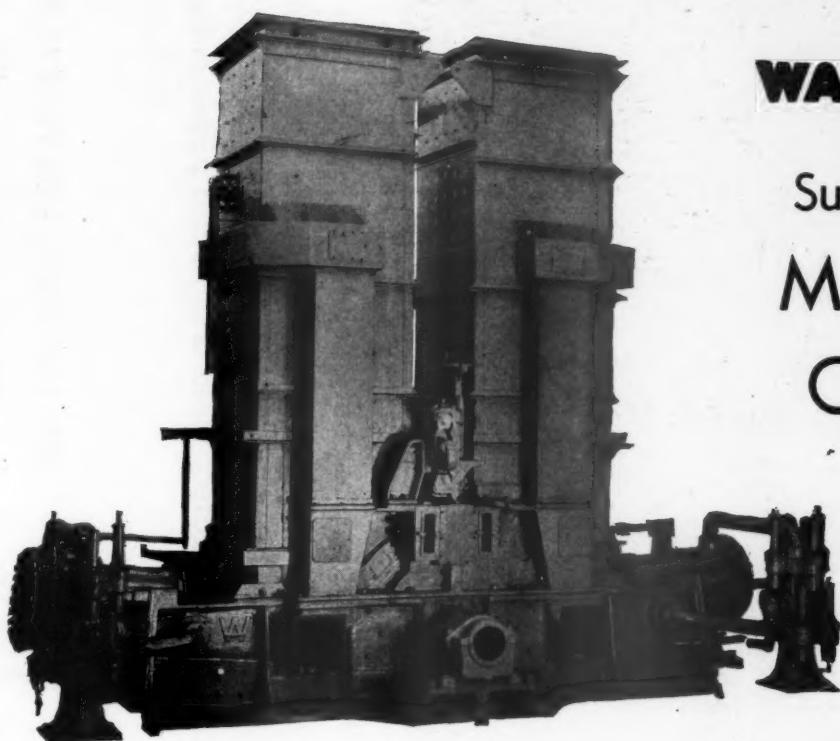
But, against this shortage, various countries of the world had standing idle machine capacity of about 1,734,000 tons in 1947 and has idle capacity of over 1,500,000 tons this year. This idle capacity is about double the total present output of all newsprint mills in the United States. And it is nearly seven times the maximum 1947-48 supply shortage in the United States, estimated at 235,000 to 245,000 tons.

The presently idle machine capacity in the world, available for operation if raw materials and minor repairs were provided, thus exceeds the current supply shortage by about a half a million tons.

This is probably the main point emerging from the figures of the world situation, says the Canadian association, because it has not before been clearly seen. To date the only cure for the shortage has seemed to rest in new capacity somewhere; these figures indicate that a much quicker, more practical and more economical cure, to some extent at least, may be

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UNITED STATES—CANADA—NEWFOUNDLAND





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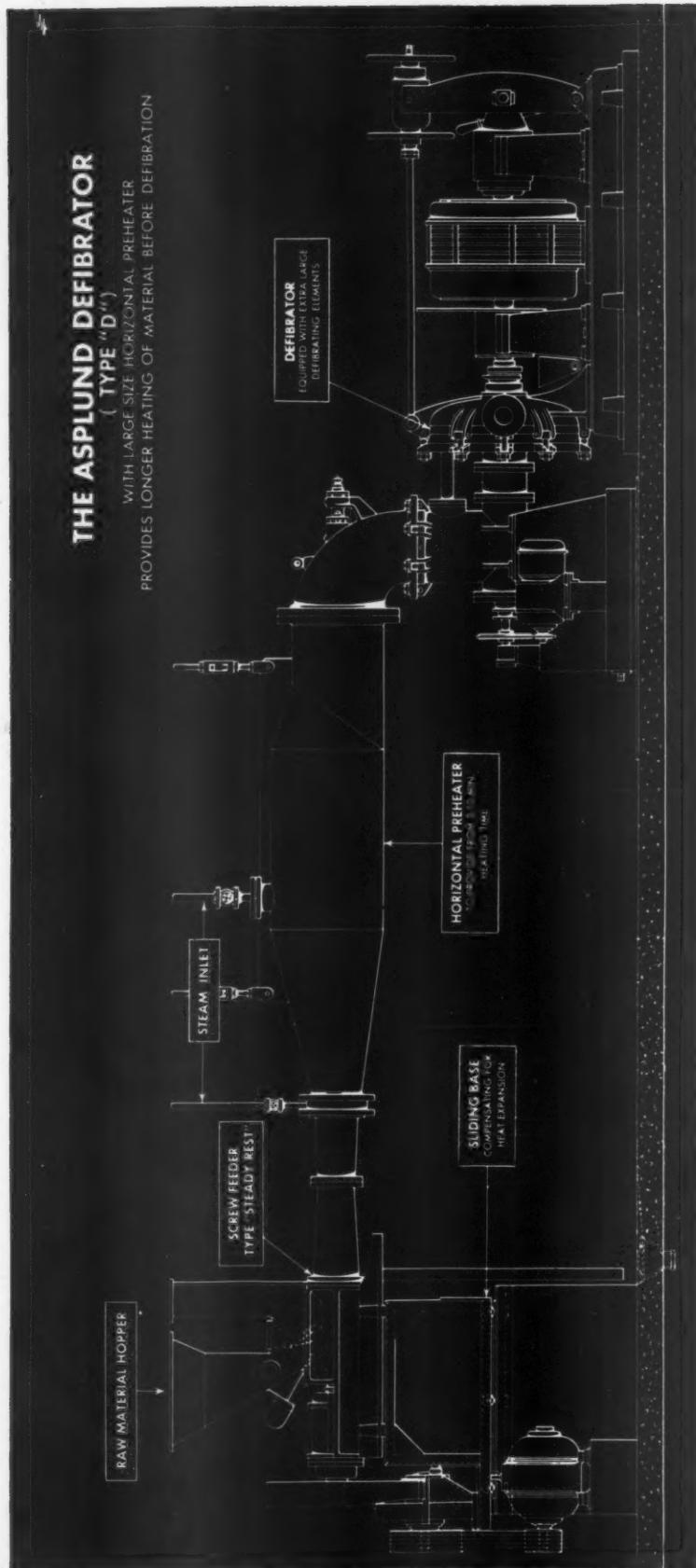
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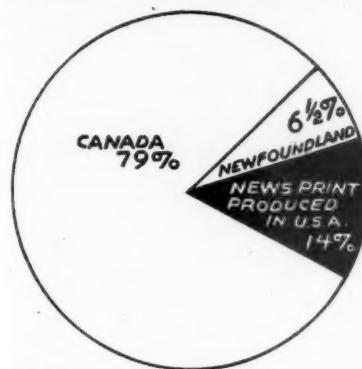
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U. S. Newsprint Industry's Share of Domestic Market Continues to Decrease

Each circle here represents the total amount of newsprint in the United States available for consumption in that year, with percentages supplied from domestic and foreign sources.



1947—



1945—



1915—

SOURCES OF NEWSPRINT USED IN THE UNITED STATES

(Tons in Round Numbers)
Source: News Print Service Bureau

	U. S. Production	U. S. Exports	Imports into the U. S. From Canada	Imports into the U. S. From Newfoundland	Europe	Available for Consumption
1913	1,305,000	43,000	219,000	—	1,000	1,482,000
1914	1,313,000	61,000	310,000	—	5,000	1,367,000
1915	1,239,000	55,000	367,000	—	1,000	1,552,000
1916	1,315,000	76,000	468,000	—	—	1,707,000
1917	1,359,000	94,000	558,000	—	1,000	1,824,000
1918	1,260,000	97,000	596,000	—	—	1,759,000
1919	1,375,000	111,000	628,000	—	3,000	1,895,000
1920	1,512,000	49,000	679,000	1,000	50,000	2,193,000
1921	1,225,000	17,000	657,000	—	135,000	2,000,000
1922	1,448,000	26,000	896,000	—	133,000	2,451,000
1923	1,485,000	16,000	1,109,000	—	200,000	2,778,000
1924	1,481,000	17,000	1,197,000	4,000	156,000	2,821,000
1925	1,530,000	23,000	1,295,000	20,000	133,000	2,955,000
1926	1,684,000	19,000	1,658,000	94,000	100,000	3,517,000
1927	1,486,000	12,000	1,776,000	89,000	122,000	3,461,000
1928	1,418,000	11,000	1,926,000	114,000	116,000	3,563,000
1929	1,392,000	19,000	2,195,000	132,000	96,000	3,796,000
1930	1,282,000	10,000	1,989,000	156,000	134,000	3,551,000
1931	1,157,000	10,000	1,754,000	160,000	151,000	3,212,000
1932	1,009,000	8,000	1,533,000	114,000	144,000	2,793,000
1933	946,000	11,000	1,545,000	95,000	153,000	2,728,000
1934	961,000	23,000	1,956,000	107,000	147,000	3,148,000
1935	912,000	23,000	2,062,000	124,000	197,000	3,272,000
1936	921,000	15,000	2,422,000	87,000	243,000	3,658,000
1937	946,000	17,000	2,899,000	124,000	294,000	4,246,000
1938	820,000	6,000	1,938,000	94,000	243,000	3,089,000
1939	954,259	13,000	2,206,000	104,600	310,000	3,561,859
1940	1,013,000	44,000*	2,586,000	157,000	34,000	3,746,000
1941	1,058,000	73,000*	2,762,000	217,000	3,000	4,015,000
1942	953,000	42,000**	2,900,000**	120,000**	None	3,800,000
1943	805,000	35,000**	2,792,000**	110,000**	None	3,250,000
1944	717,120	40,161**	2,430,000**	100,000**	None	3,650,000
1945	724,000	18,000	2,534,000	142,000	None	3,362,000
1946	771,000	8,000	3,272,000	205,000	13,000	4,263,000
1947	826,000	8,000	3,675,000	212,000	125,000	4,830,000

*Includes paper which is not standard newsprint. Standard newsprint exports from the U. S. during 1940 did not exceed 13,000 tons; during 1941 the exports did not exceed 23,000 tons.

**Dept. of Commerce figures and includes non-standard newsprint.

available through existing capacity which is standing idle.

One notable point is the projected expansion of productive ability by Canada and Newfoundland in contrast with the decline of the other producing countries as a whole. The figures (in thousands of tons) are as follows:

	1939	1949
Canada and Newf'd.....	4,668	5,096
Other Countries	5,775	3,235
World Total	10,443	8,331

Compared with 1939 Canada and Newfoundland show expansion in productive ability of 428,000 tons by 1949. The rest of the world, in the same period, shows a decline of 2,540,000 tons, or 44 per cent. These figures of decline explain the present world shortage and illustrate what might be achieved by restoring to production the machine capacity presently standing idle in countries other than Canada and Newfoundland.

The improvident attitude of the newspaper publishing industry in the United

States in not taking the long term view of newsprint supply and doing something about helping to husband its resources and preserve a profitable newsprint industry, is brought home forcibly by this fact from the Canadian report:

United States newsprint consumption has steadily increased for the past 60 years or so. It has increased not only in proportion to growth of population but also in per capita use, from a total of less than 200,000 tons and about six pounds per

U. S. MILLS MAKING NEWSPRINT

This table shows how sharply newsprint production in the U. S. has declined. In fact, if a 1913 column were added, we would have to list no less than 65 companies.

The 1948 figures are estimates unofficially made by **PULP & PAPER** editors in a nationwide survey. In some cases these capacities were not reached until early in the year 1948—for instance, the Hawley mill only recently sold to a group including Los Angeles and Salt Lake City newspapers. The new Southland machine is just coming into production this spring. The new Coosa River Newsprint o.c. of Alabama is not expected to produce this year.

The data for 1926 and 1946 were prepared by a now defunct U. S. War Production Board committee. Our 1948 total is slightly higher than the official estimate of capacity for this year made by the of 850,000 tons made by the News Print Service Bureau of New York. This is due Our figure is higher because of later developments which apparently partly because of later developments.

It is interesting to note that virtually every added ton of newsprint in the past two years has resulted from the purchase or investment in paper mills by newspaper publishers.

Of the added capacity in 1948, the port on produced by Michigan Paper Co. of Plainwell is being made from 80% de-inked paper stock.

COMPARISON BETWEEN NUMBER OF COMPANIES PRODUCING NEWSPRINT IN U. S. IN 1926, 1946 and 1948

	Tons, Estimated Capacity	1926	1946	1948
Alexandria Paper Co.	15,000	.....	.....	.....
Algonquin Paper Co.	29,000	.....	.....	.....
Cliff Paper Co.	13,000	.....	.....	.....
Consolidated Water P. & Pa. Co.	102,000	.....	.....	.....
Crown Zellerbach Corp. (and predecessors)	174,000	200,000	200,000	.....
Cushnoc Paper Co.	20,000	.....	.....	.....
De Grasse Paper Co.	56,000	.....	.....	.....
Dells Pulp & Paper Co.	12,000	.....	.....	.....
Escanaba Paper Co.	370,000	.....	.....	.....
Finch, Pruyne & Co.	44,000	10,000	.....	.....
Flambeau Paper Co.	14,000	.....	.....	.....
Gilman Paper Co.	17,000	.....	.....	.....
Gould Paper Co.	30,000	.....	.....	.....
Grandfather Falls Co.	11,000	.....	.....	.....
Great Northern Paper Co.	257,000	300,000	300,000	.....
Great Western Paper Co.	20,000	.....	.....	.....
Hawley Pulp & Paper Co.	9,000	56,000	75,000	.....
Hennepin Paper Co.	12,000	.....	.....	.....
High Falls Pulp & Paper Co.	8,000	.....	.....	.....
Inland Empire Paper Co.	29,000	.....	.....	.....
International Paper Co.	323,000	.....	.....	.....
Blandin Paper Co.	22,000	.....	.....	.....
Maine Seaboard Paper Co.	.....	104,000	.....	.....
Manistique Pulp & Paper Co.	20,000	.....	.....	.....
Michigan Paper Co. of Plainwell	.....	.....	15,000	.....
Minn. & Ontario Paper Co.	76,000	.....	.....	.....
Nekoosa-Edwards Paper Co.	10,000	.....	.....	.....
Northwest Paper Co.	14,000	.....	.....	.....
Oswegatchi Paper Co.	16,000	.....	.....	.....
Oswego Falls Corp.	11,000	.....	.....	.....
Pacific Paperboard Co.	.....	.....	15,000	.....
Peavey Paper Mills	.....	.....	9,000	.....
Pejepscot Paper Co.	41,000	.....	37,500	.....
St. Croix Paper Co.	55,000	75,000	75,000	.....
St. George Paper Co.	10,000	.....	.....	.....
St. Regis Paper Co.	115,000	.....	.....	.....
Sheffield Paper Mills	.....	.....	10,000	.....
Sherman Paper Co.	16,000	.....	.....	.....
Southland Paper Mills	.....	55,000	100,000	.....
Tidewater Paper Mills Co.	32,000	.....	.....	.....
Watab Paper Co.	17,000	.....	.....	.....
Waterway Paper Prod. Co.	14,000	.....	.....	.....
West End Paper Co.	13,000	.....	.....	.....
West Tacoma Newsprint Co.	.....	.....	15,000	.....
Wisconsin River Paper & Pulp Co.	25,000	.....	.....	.....
TOTAL	1,739,000	820,000	871,500	

capita in 1890 to an estimated 1947 demand (if supply were unlimited) of 4,960,000 tons and almost 70 pounds per capita.

In the post-war period of 1946-48 U. S. consumption or demand is continuing to

increase by both of these factors: population growth and per capita increase. The increase from per capita use is currently about double the increase due to population growth. As with most commodities,

it seems inevitable that a saturation point of per capita use will be reached but there is as yet no statistical evidence that it has been reached in the United States.

In the consumption of newsprint, these figures from the Canadian association show how U. S. consumption reached over 60% of the world total in recent years as compared with about 40% in 1933:

Consumption in Thousands of Tons

	United States	Rest of U. S. World	Percentage
1927	3,445	2,888	54.4%
1930	3,563	3,437	50.9
1933	2,692	3,988	40.3
1936	3,692	4,538	44.9
1939	3,520	4,207	45.2
1946	4,296	2,753	61.0
1948	4,900	3,143	60.9

Production

Doing their utmost to keep pace with the unprecedentedly high demand for their product, the North American mills engaged in the manufacture of newsprint paper turned out 5,646,000 tons in 1947. This was an increase of 369,000 tons or 7% over the record production in 1946 and also was 702,000 tons or 14% above that in the pre-war peak year of 1937. In the past two years there has been a combined increase in production amounting to 1,330,000 tons.

North American production of newsprint in March, 1948—481,076 tons—exceeded that of any March on record. Canadian mills produced 20,204 tons more in the first three months of 1948 than in the first three months of 1947, which was an increase of 1.9%. U. S. output was 11,348 tons or 5.7% down and Newfoundland's was 13.2% less, making a net decrease of 3,540 tons, or 0.3% less than in the first three months of 1947.

Of the continental total in 1947, according to J. J. Zima, statistician for the News Print Service Bureau in New York, Canadian mills turned out 4,447,000 tons or not quite 79%; the United States segment of the industry produced 826,000 tons or approximately 14½%, while the remaining 6½% was represented by Newfoundland's production which amounted to 373,000 tons. While there was very little change from the 1946 per cent of total figures, they compared with 74% for Canada, 19% for the United States and 7% for Newfoundland in 1937.

There is no longer a single pound of newsprint produced in Mexico, where the political candidates, who got newsprint on credit, killed the golden-egg laying goose, as it were. Their activities made newsprint manufacturing a most unprofitable business below the Rio Grande.

Canadian production in 1947 exceeded that of the preceding year by 304,000 tons, or slightly more than 7%; the increase in the United States was 55,000 tons or 7%, while the gain in Newfoundland's output, which was curtailed somewhat due to pulpwood shortage at one of the mills earlier in the year, amounted to 10,000 tons or 3%. Production of newsprint in Canada and Newfoundland attained record proportions last year while that in the United States was greater than in any year since 1942, but was less than half

LODDING DOCTORS

Calender by:
The Sandy Hill Iron & Brass Works

Engineered for every position on every machine by Lodding

Engineering Corporation, Worcester, Massachusetts, U. S. A.

Represented outside New England by W. E. Greene Corporation,

Woolworth Building, New York.

the tonnage produced in 1926, the year of largest output in this country.

Shipments of newsprint paper from all mills totaled 5,706,000 tons in 1947 and were 447,000 tons or 8½% greater than in 1946. They were also larger than production by 60,000 tons and resulted in a corresponding decrease in stocks held by all manufacturers. Canadian mills shipped 354,000 tons more than in the preceding year, while movement of paper from producing points in the United States and Newfoundland exceeded that of 1946 by 70,000 tons and 23,000 tons respectively.

Total manufacturers' stocks on Dec. 31, 1947, amounted to 102,000 tons and were 37% below those of a year earlier. In the course of the year the Canadian mills reduced their stocks by 43,000 tons or almost one-half, while the decrease in those held by United States and Newfoundland producers was 7,000 tons or 45½% for the former and 10,000 tons or 17% for the latter. These stocks were equivalent to less than one week's production at the rate attained last year.

According to official reports issued by the Bureau of Statistics, exports of newsprint paper from Canada in 1947 amounted to 4,220,000 tons with a value of \$342,300,000 and both in tonnage and value thereof were the largest ever recorded. This was an increase of 363,000 tons or about 9½% in volume and \$76,400,000 or 29% in value over 1946. Newsprint exports accounted for more than 12% of the total value of Canada's export trade last year.

Of the total tonnage exported, 3,675,000 tons or 87% was shipped to the United States, while 545,000 tons or 13% was destined for overseas markets. The quantity exported to the U. S. was the largest on record and surpassed that of the preceding year by 352,000 tons, while shipments elsewhere were only 10,000 tons greater than in 1946 and were not equal to those in a number of earlier years. With the exception of the war years 1942-43 when, of necessity, overseas exports were drastically curtailed, the United States received a greater proportion of Canadian export shipments in 1947 than in any one

NEWSPRINT EXPORTS FROM CANADA

(Short Tons)

	U. S. A.	Overseas	Total
1947	3,675,000	545,000	4,220,000
1946	3,323,000	534,000	3,857,000
1945	2,534,000	525,000	3,059,000
1944	2,409,000	391,000	2,800,000
1943	2,545,000	265,000	2,810,000
1942	2,792,000	213,000	3,005,000
1941	2,762,000	500,000	3,262,000
1940	2,586,000	657,000	3,243,000
1939	2,206,000	452,000	2,658,000
1938	1,938,000	486,000	2,424,000
1937	2,899,000	556,000	3,455,000
1936	2,399,000	594,000	2,993,000
1935	2,052,000	523,000	2,575,000

of the preceding 16 years.

In the order named, Australia, the United Kingdom and Argentina were the largest overseas importers of Canadian newsprint in 1947 and took 49% of the total sent overseas. Shipments with Australia as their destination totaled 162,000 tons, those to the United Kingdom were 56,000 tons and to Argentina 50,000 tons. The corresponding figures for 1946 were 135,000 tons, 83,000 tons and 46,000 tons.

In 1947 the Newfoundland mills shipped 212,000 tons to the United States and 169,000 tons to overseas, making a total of 381,000 tons which exceeded the 1946 record by 22,000 tons or 6%. Exports to the United States represented almost 56% of the total and were 4,000 tons greater than in the preceding year. They also were larger than in any other year except 1941 and were but 5,000 tons below that year. While there was an increase of 18,000 tons over 1946 in exports to overseas destinations, the total was 13% below that of 1945 and 20% below the 1937-40 average.

Direct shipments made by U. S. newsprint manufacturers beyond the borders of this country are reported to have totaled slightly more than 8,000 tons in 1947 and were of the same order as in 1946, but were substantially below those in any year since 1939. These shipments amounted to but 1% of production.

The North American newsprint industry

as a whole shipped 722,000 tons of paper last year to markets elsewhere in the world or 28,000 tons more than the 694,000 tons exported in 1946. The 1947 total would have been larger had it not been for governmental restrictions imposed on the importation of newsprint into certain countries.

Imports of newsprint from Europe into the U. S. were much larger last year, but still only one-half the average in the years 1935-1939. The largest tonnage of European newsprint came from Finland with 68% of the indicated 125,000 tons of overseas imports originating in that country. Sweden, supplying approximately 16½% of the total was next in importance. The balance was represented by relatively small quantities from France, Norway, Austria, Poland and the Netherlands.

Stocks

The 102,000 tons of newsprint reported in stock by all North American producers at the end of last year was 60,000 tons below that on Dec. 31, 1946, and was lower than at any year-end in the past 15 years. On the same date the newspapers reporting to the American Newspaper Publishers Association had stocks on hand or in transit amounting to 377,000 tons, which adds up to a total of 479,000 tons for these two groups. There was an increase over 1946 of 84,000 tons in the quantity held by these publishers, but it was largely counter-balanced by the decrease in manufacturers' stocks so that there was a net increase of only 24,000 tons.

There has been an increase in A.N.P.A. publishers' stocks of 111,000 tons from their recent year-end low of 266,000 tons in 1945, but they are 102,000 tons below those at the end of 1942 and 8,000 tons less than at the close of 1941. In relation to present consumption they are by no means excessive since at the end of last December they were equal to only 36 days' usage. While they had 5 days' more supply than at the end of 1946 it was, however, below that at the end of any December since 1936.

Consumption of Newsprint

In view of record-breaking newspaper advertising lineage and circulations apparently at an all-time peak, it is not surprising that more newsprint paper was

WORLD CAPACITY vs DEMAND and SUPPLY

In thousands of short tons

	Prewar	1946	1947	1948	1949
1. Existing Machine Capacity	10,443	9,300	9,403	9,656	9,841
2. Capacity Actually in Use	—	7,120	7,669	8,146	8,331
3. IDLE MACHINE CAPACITY	—	2,180	1,734	1,510	1,510
4. Demand, No Restrictions	8,030	8,775	9,320	9,694	—
5. Govt. Restrictions of Demand	—	400	500	600	—
6. Probable Actual Demand	—	8,375	8,820	9,094	—
7. Supply Obtained or Expected	8,030	7,049	7,680	8,043	—
8. Shortage from Actual Demand	Nil	1,326	1,140	1,051	—
9. Idle Capacity (line 3 above)	—	2,180	1,734	1,510	1,510
10. Shortage (line 8 above)	Nil	1,326	1,140	1,051	—
11. EXCESS IDLE CAPACITY	—	854	594	459	—

Source—Newsprint Association of Canada.

To Insure Quality



Depend on GRM Products

SINCE 1911

GRIFFITH RUBBER MILLS

2439 N.W. 22nd Avenue

BEacon 7126

PORLAND 10, OREGON

used in the United States last year than ever before in history. Despite the record usage there still were many complaints about inadequate supply.

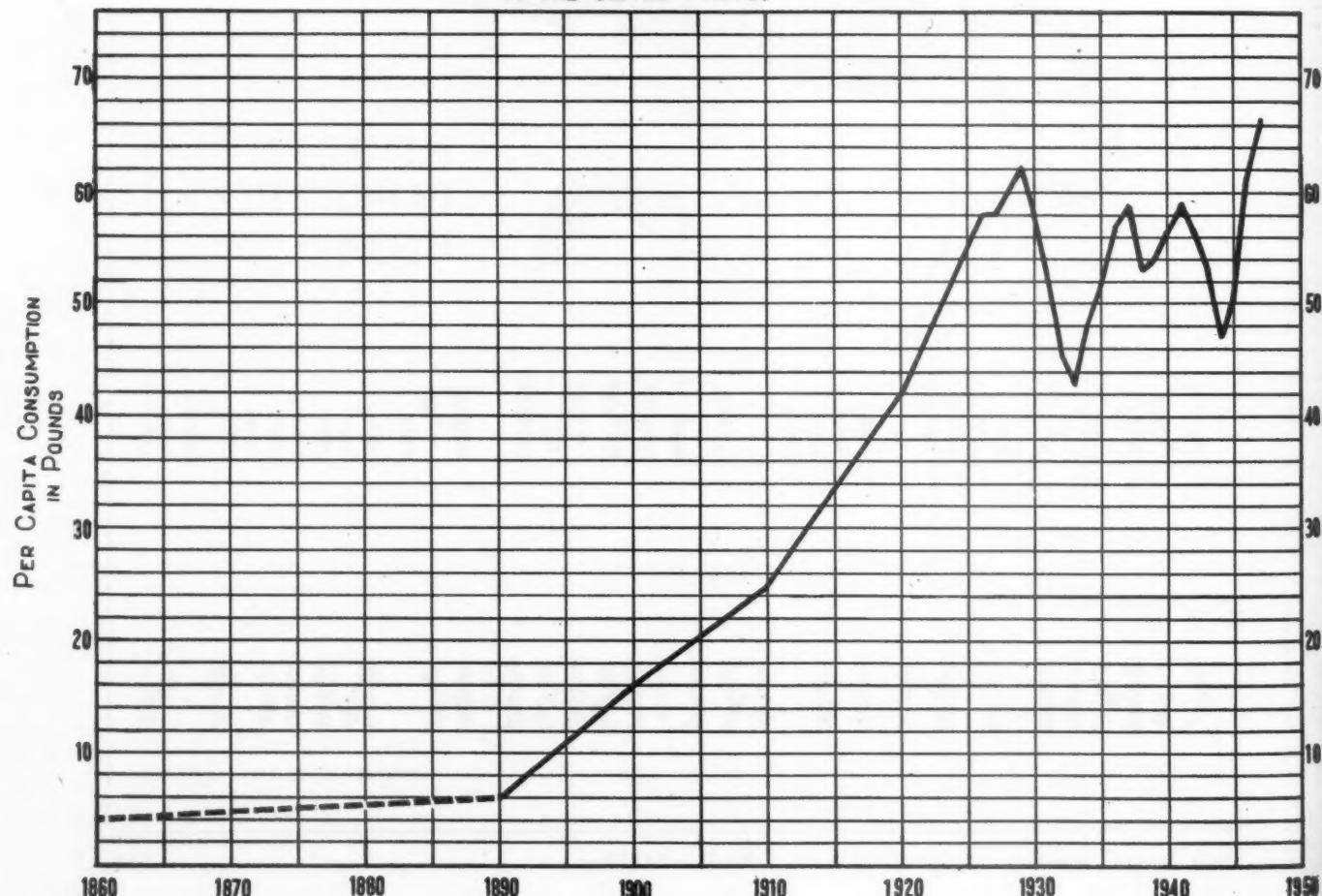
The publishers reporting to the American Newspaper Publishers Assn. used in round numbers 3,565,000 tons of newsprint paper in 1947—an increase of 429,000 tons or 14% over the quantity used in 1946. This was the largest consumption ever reported by this group and exceeded all previous peaks by substantial margins.

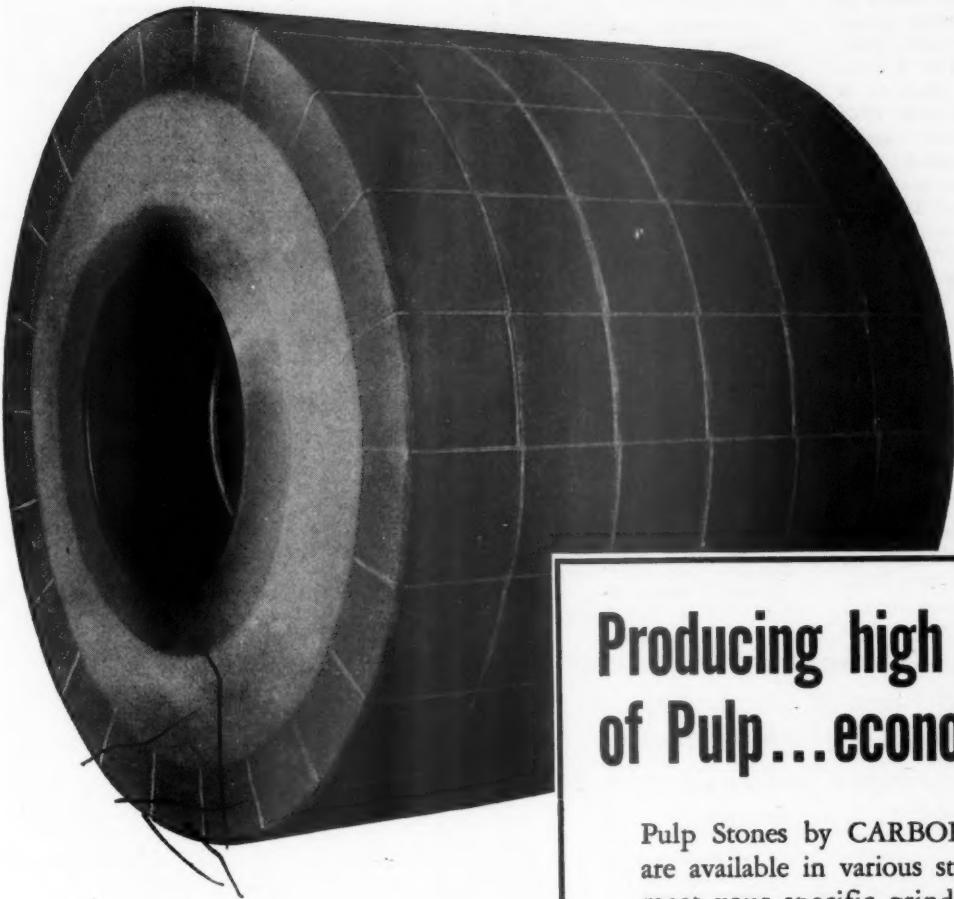
Consumption in every month of the year showed an appreciable percentage increase over that of the corresponding 1946 month with a peak increase of 21%

U. S. CONSUMPTION OF NEWSPRINT

Year—	Population	Newsprint Tons	Paper Used Per Capita
1935	127,521,000	3,300,000	51.7 lbs.
1936	128,429,000	3,650,000	56.8 lbs.
1937	129,257,000	3,830,000	59.3 lbs.
1938	130,215,000	3,458,000	53.1 lbs.
1939	131,878,000	3,550,000	54.1 lbs.
1940	132,817,000	3,730,000	56.2 lbs.
1941	133,923,000	3,930,000	58.7 lbs.
1942	134,633,000	3,800,000	56.4 lbs.
1943	136,497,000	3,650,000	53.5 lbs.
1944	138,101,000	3,250,000	47.1 lbs.
1945	139,621,000	3,480,000	49.8 lbs.
1946	141,229,000	3,296,000	61.0 lbs.
1947	143,382,000	4,753,000	66.3 lbs.

PER CAPITA CONSUMPTION OF NEWS PRINT IN THE UNITED STATES





PULP STONES

By

CARBORUNDUM
TRADE MARK

Producing high grades of Pulp...economically

Pulp Stones by CARBORUNDUM are available in various structures to meet your specific grinding conditions. Produced under scientific control, they offer safe continuous low cost operation.

These wheels operate on long burning cycles assuring fewer variations in pulp quality. They are strong, durable, and economical. The Carborundum Company, Niagara Falls, New York.



"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company.

exceeded in any month since November, 1929.

Leading daily newspapers did not show as great an increase as those issued on Sunday, but nevertheless were almost 7½% larger in size than in 1946. They averaged 29 pages during 1947 or 2 pages more than in 1946 and were equal to or higher than in any year since 1929. Only in the month of July—when they equaled the 1946 average—the dailies failed to exceed the similar month of the preceding year. The October average of 33 pages was the highest of the year and the 4-page increase over the same month of 1946 was higher than that recorded by any other month in 1947.

Advertising in general not only had a good year in 1947, it was moreover the best on record. However, not all media did equally well. Of the three major media, advertising in newspapers—despite necessary rationing of space by many publishers—scored the most impressive gains over the preceding year.

Newspapers in the 52 major cities of the United States tabulated by Media Records carried the record total of 2,009,000,000 agate lines of advertising in 1947. This exceeded the total of the previous record

year of 1929 by 111,000,000 lines or 6%, and was 279,000,000 lines or 16% above 1946. It was also 943,000,000 lines or 82½% above the depression low of 1933.

In making long-time comparisons, the News Print Bureau finds that in ten of the twelve months of 1947—the exceptions were March and May—lineage was greater than in any similar month on the record going back to 1928. Furthermore, the highest monthly total in any prior year—that of 182,490,000 lines in October, 1929—was exceeded in each of the last three months of 1947.

CANADA'S NO. 1 INDUSTRY

There are 19 companies in Canada producing newsprint; some large, some small. They operate 35 newsprint mills, ranging in capacity from 10,000 to 250,000 tons a year. About 80% of total capacity is in Ontario and Quebec; about 50% is in Quebec.

In total forest area Canada has nearly 13 million square miles, exceeded only by Soviet Russia and Brazil. Productive forest in Canada is 770,000 square miles, with 430,000 presently classed as accessible. About 174,000 square miles have been leased for industrial use, chiefly for pulp and paper.

Newsprint is Canada's largest manufacturing industry and chief export commodity. The industry is semi-public because 90% of its wood is owned by the public and is used under

governmental supervision. This Canadian industry is also one of the world's great enterprises. Its present mill capacity of 4,350,000 tons a year is four times the capacity of any other country and is equal to the combined capacities of the United States, Britain, Sweden, Norway and Finland.

The industry's development to date has been largely based on, and in response to, the growth of United States demand. It has, in turn, made possible the greatly expanded scope and maintenance of United States newspapers. As a Canadian editor recently stated: "Newsprint is a perfect example of continental development of industry in North America, mutually advantageous to the United States and Canada."

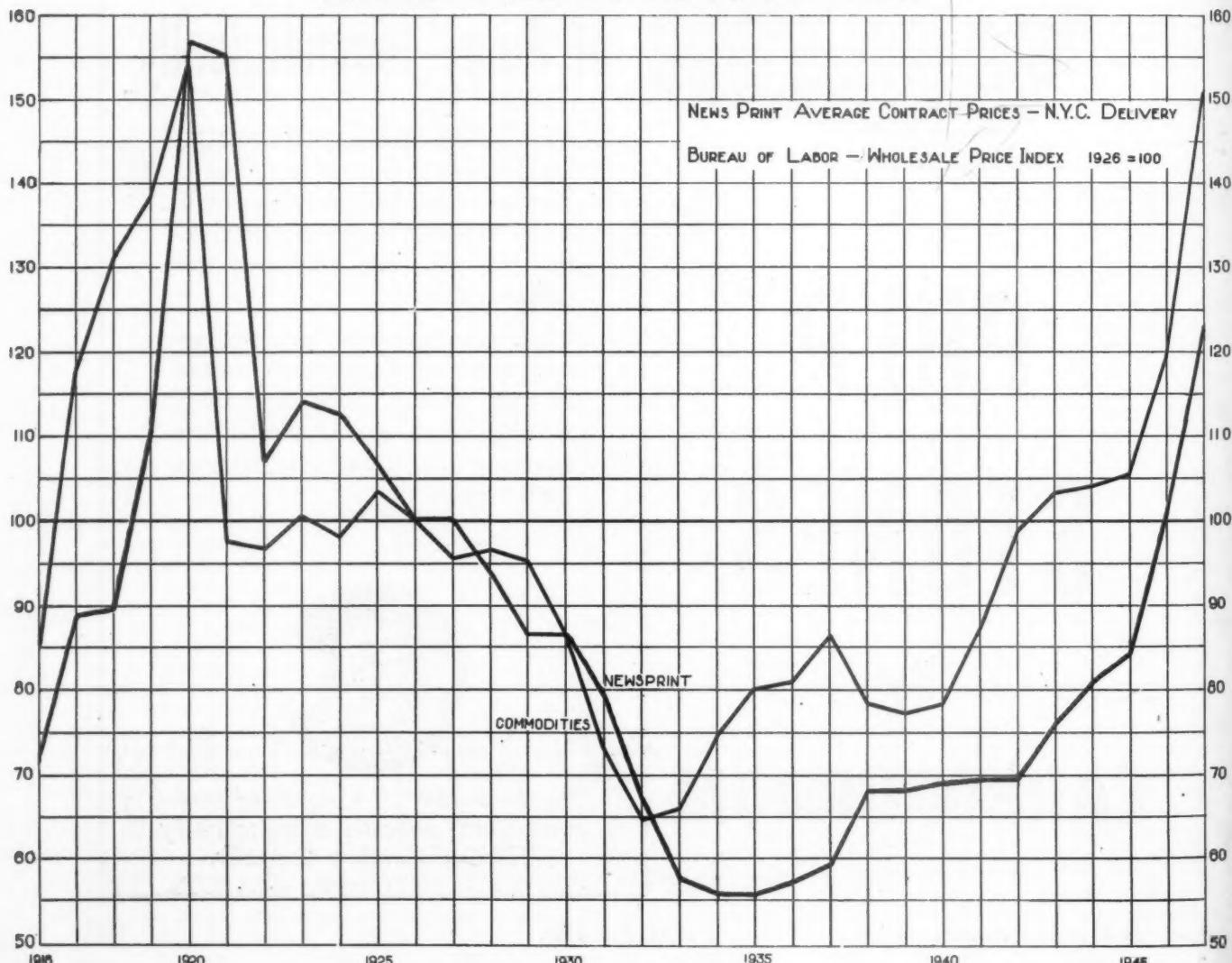
CANADIAN NEWSPRINT CAPACITY AND PRODUCTION

In thousands of short tons.

	Rated Capacity	Idle Capacity	Operating %
1925	1,715	193	88.8
1930	3,600	1,096	69.6
1932	3,840	1,926	49.9
1935	3,914	1,163	70.3
1937	3,883	235	93.9
1940	4,368	949	78.3
1943	4,315	1,332	69.1
1945	4,301	1,042	75.8
1946	4,279	136	96.8
1947	4,350	nil	101.1
1948	4,447	nil	101.6
1949	4,552	nil	101.4
1950	4,650	nil	100.0

Source: Newsprint Association of Canada; 1947-1950 NAC estimates from company reports.

COMPARISON OF NEWS PRINT AND COMMODITY PRICES



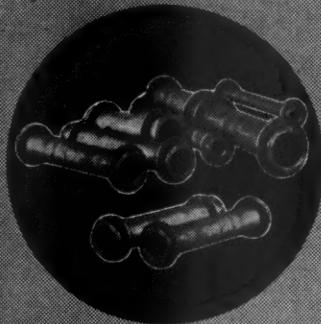
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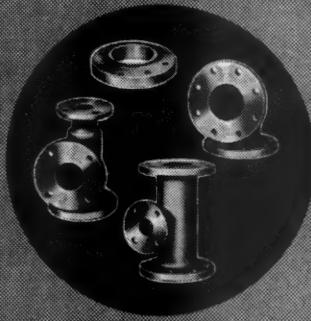
RESIST

CORROSION • ABRASION • HEAT *in the Paper Mill*

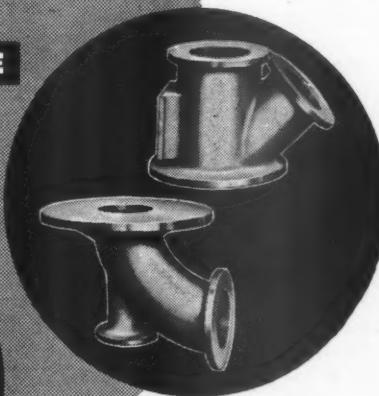
with **COOPER STAINLESS STEEL...**



CENTRIFUGAL PIPE



FITTINGS



CASTINGS

COOPER'S years of close association with the Paper Industry and its intimate knowledge of the problems peculiar to that industry . . . plus vast technical experience combined with practical shop skill has resulted in COOPER'S unusual ability to produce sound corrosion resisting Stainless Steel castings, fittings, and centrifugal pipe specifically designed to resist corrosion, abrasion and heat in the Paper Mill.

Each step in the production of COOPER Stainless Steel products is fully controlled . . . for all facilities and services at COOPER are located under one roof making The Cooper Alloy Foundry Co. the largest of its kind in the country.



THE COOPER ALLOY FOUNDRY CO.
HILLSIDE, NEW JERSEY

Specialists in Corrosion Resisting Stainless Steel . . . for a Quarter of a Century



Pulp-Paper Conversion INTO PLASTICS INCREASES

ALL non-paper uses of wood pulp are discussed under this heading of "plastics," taking a broad definition of that magic word. Rayon, cellulose, lacquers, photographic film, wood pulp molds and laminates and even alcohol products are embraced in the broad term plastics.

Several important pulp and paper companies are making paper and pulp plastics as by-products of their operations and market pulp mills and paper mills are supplying materials for additional production of plastics.

Total U. S.-produced wood pulp used for non-paper products according to the U. S. Pulp Producers Association, amounted to a record high figure of 546,248 tons in 1947, which was a 16% increase over the 1946 total of 472,907 tons.

These figures substantially surpassed even the war years, when annual production of more than 400,000 tons in the U. S. alone was attained in making pulp for smokeless powder to fire most Army medium and big guns.

By far the greatest part of this pulp from both the U. S. and Canada is bleached sulfite and it comes from market pulp mills. For instance, in the U. S., bleached sulfite used for this purpose totaled 516,115 tons in 1947 as compared with 452,850 tons in 1946, an increase of 14% and all of it from market pulp mills. The unbleached sulfite pulp from U. S. mills which went into plastics totaled only 4,577 tons in 1947 and 2,719 tons in 1946. This was all from pulp marketing mills.

For the first time, in 1947, kraft pulp from U. S. mills was converted to plastics or non-paper uses, the amount being 5,646 tons. This was all bleached kraft but it was converted by the manufacturers and not marketed. Likewise, soda pulp was used for non-paper products for the first time in 1947—a total of 386

tons being so converted by manufacturer.

A total of 18,891 tons of groundwood were made into non-paper products in 1947 compared with 16,803 tons in 1946, an increase of 12%, all within manufacturing premises. Screenings totaling 633 tons were marketed for plastics use as compared with 538 tons in 1948. All this data apply only to production of U. S. mills and are shown in the U. S. Pulp Producers Association tables published in the "Pulp" section of this Review Number.

By far the greatest part of this non-paper pulp goes into production of rayon and the figures for the rayon field are published in the "Rayon" section of this Review Number.

Nitrocellulose, oldest of the plastics, is a base material for many products from movie film to lacquers and protective coatings. Government statistics published in this section show that there is an upward trend in production of nitrocellulose rods, sheets and tubes (see page 154).

A North American Survey Of Dissolving Pulp Industry

Rex Vincent, technical consultant for Bulkley, Dunton Pulp Co., New York, has again prepared a survey of the purified pulps and dissolving pulps field for this NORTH AMERICAN REVIEW NUMBER, just as he did last year.

His survey shows a remarkable increase in the production of these pulps in the past year and he has made some highly interesting observations. Also he has produced for these pages an authoritative estimate of the breakdown of uses of this type of pulp which is most interesting.

It will be noted that his figures for U. S. production of 408,460 tons in 1947 (see table) is substantially below U. S. con-

DISSOLVING PULP PRODUCTION

	1938	1940	1945	1946	1947
U. S. Production	171,650	288,500	355,820	295,680	408,460
U. S. Imports	65,220	113,945	146,030	198,540	248,070
U. S. Exports	72,800	115,204	13,030	9,300	14,570
Net Available	164,070	287,241	488,520	484,920	641,960

Prepared by Rex Vincent, Bulkley, Dunton Pulp Co.

U. S. PRICES OF DISSOLVING WOOD PULP

Prices are per 2,000 pounds, air dry basis (10% moisture content), freight equalized for gross weight on respective Atlantic Seaboard or Gulf ports.

	For Regular Viscose	For High Tenacity & Cupra Viscose	For Acetate & Cupra Rayon
May 1938	\$ 85		
Feb. 1939	75		
Apr. 1940	80		\$100
Jul. 1940	85	100	100
Jul. 1943	85	100	110
Apr. 1944	95	100	110
Jan. 1946	107½	112½	117½
Nov. 1946	122	127½	138½
Feb. 1947	139	147	158
Dec. 1947	149	158	172

sumption figures and that imports have doubled in seven years.

This survey made by Mr. Vincent embraces what are known as dissolving or purified pulps which go into rayon, plastics, etc. He states that the increase in his 1947 figures by such a big margin over his corresponding figures for 1946 are due largely to various operations being brought up to capacity and the production of large quantities of pulp which fall into his category but which are not used directly for either viscose or acetate. Pulps for nitrocellulose and sanitary napkins are one example; pulps for facial tissue and photograph paper is another.

All of the U. S. 1947 imports, says Mr. Vincent, came from Canada with the exception of 23,700 tons which came in from Sweden. The increase in American production comes close to the limit of capacity except in the case of certain types of pulps that can be diverted from the paper trade by mills that are currently making both paper and dissolving type pulp. Mr. Vincent expects that 1948 production will be nearly the same as in 1947.

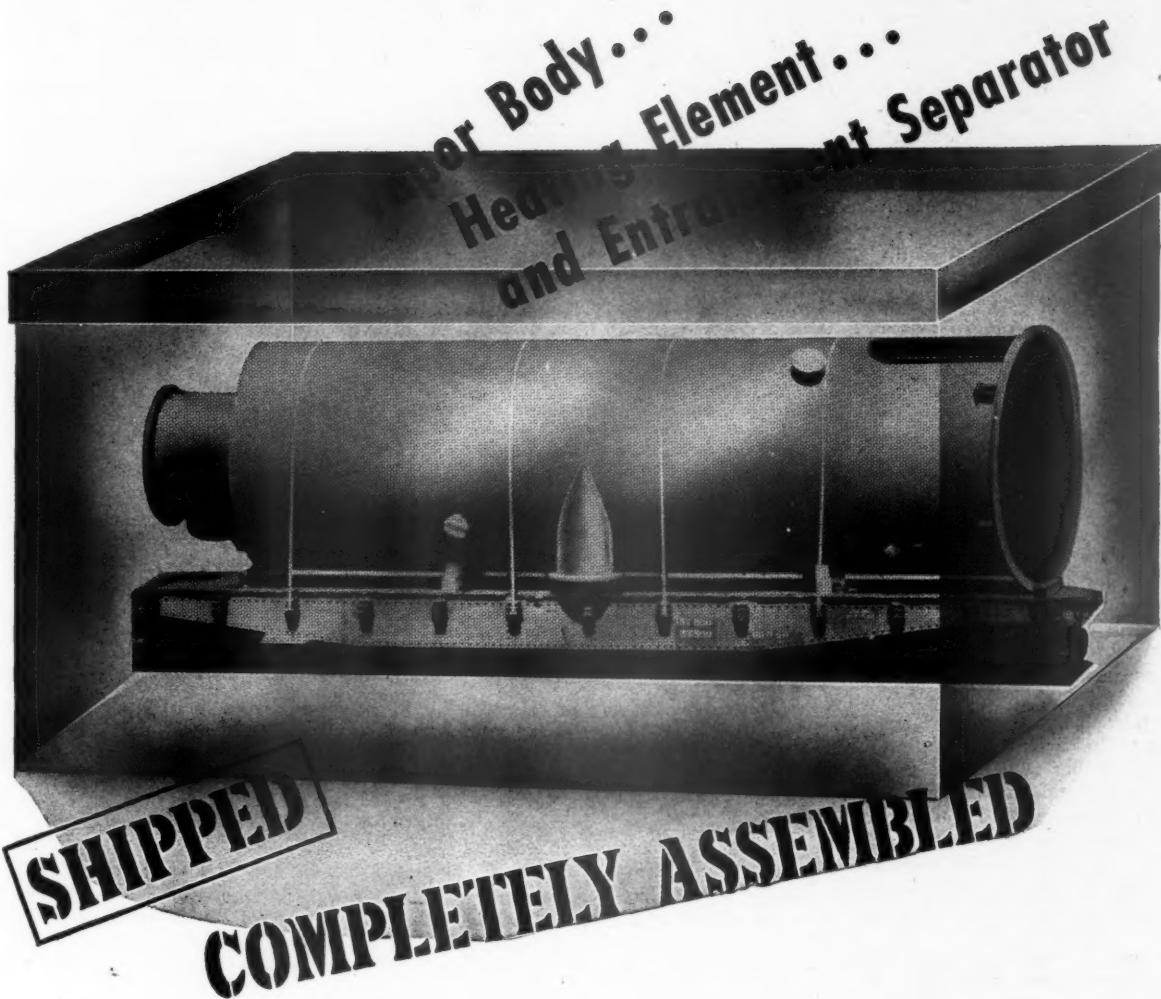
In Canada the production for 1947 was 298,530 tons of which 286,170 were exported. A total of 224,730 tons were exported to the U. S. which amounts to 78% of the total Canadian exports and 75% of the Canadian production. In 1946 Canada supplied 39% of our total supply of these purified pulps while in 1947 the figure had dropped to 35%. It is expected that in 1948 that part supplied by Canada will increase as indications are that Canadian shipments to the U. S. will increase this year. The production there of 298,530 is still about 30,000 tons below reasonable expectations.

Production and exports on the basis of North America are shown in a table below, as prepared by Mr. Vincent:

	1946	1947	1948*
Production	555,000	706,990	735,000
Exports	60,000	56,010	60,000
Net Available for			
North America	495,000	650,980	675,000

*Estimated.

"In 1938, only ten short years ago, the North American production of these pulps was only 286,680 tons and of this quantity over 116,000 tons were exported," said



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Ask a General American engineer to give you further information on other installation and operating advantages of this type of evaporator.

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Mr. Vincent. "In ten years the production has almost tripled, the exports have been cut in half and there is still not enough of this pulp for North American consumption. Indications are that the consumption of these grades is being held down to match the quantity available. Certainly there is no doubt that all the purified pulp that can be made can also be consumed and it appears that pressure will be from the consumption side for several years to come."

A new mill, being built in British Columbia by Celanese Corp. of America, will add something like 65,000 tons annually to the production side in about two years but it can be assumed that this new production is already absorbed. With construction costs as high as they are likely to be for several years the pressure for more production of these grades will be put on those mills already built and operating on the production of pulp for paper. Minor expansions will also be pushed and production improvements and efficiencies will account for some small additions.

"If the purified pulps are considered from a world viewpoint the situation becomes worse," he said. "There is a far greater need for cheap textiles in other parts of the world than in the U. S. and, as recovery improves, this need will express itself as demand. Sweden should be able to satisfy most of the demand from continental Europe but the production of purified pulps in Sweden is definitely limited by the timber cut allowed by the government. This adds up to new mills for the production of purified wood cellulose and in the course of the next ten years they will be built and the odds are on construction in Canada or Alaska. What Celanese has done may be a beginning."

A natural question is . . . where were these pulps consumed? Based upon his experience and the statistics available, Mr. Vincent estimates the consumption was as outlined below

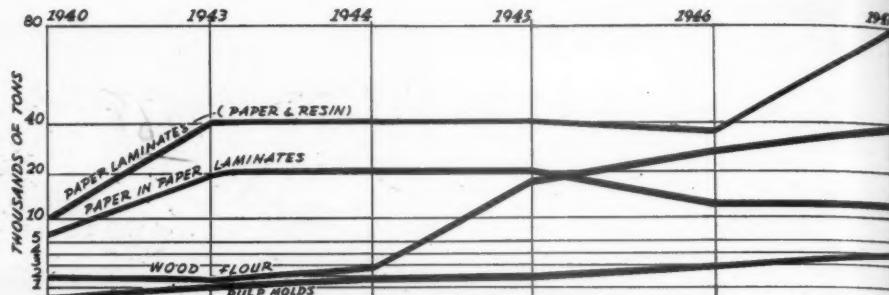
USE OF PULP IN 1947

	Tons
Total net for North America.....	650,980
Consumed in Canada.....	10,400
Increase in inventory.....	3,000
Net for U. S. consumption.....	637,580
Viscose and acetate rayon.....	401,000
Balance	236,580
Cellophane	110,000
Nitrocellulose	30,000
Balance	96,580
Special papers	22,000
Plastics	8,000
Sanitary napkins and misc.....	68,580

Plywood Overlays

Another very promising field for use of paper and pulp is in the plywood industry. The U. S. plywood plants made 2 billion sq. ft. of plywood in 1947, their big year, and virtually all of the companies are looking into the possibility of paper or pulp overlays and at least three have put in equipment for this purpose.

In this industry it is considered inevitable that a considerable percentage of plywood—one estimate is 25% in the



U. S. Laminates and Molds Production

According to estimates by A. J. Norton, consultant who has been closely associated with plastics and paper industries in New England and the Pacific Coast, the production of paper laminates has remained at about the same level since 1943—40,000 tons through 1945, declining to 38,000 tons for 1946, and rising to 39,000 tons in 1947.

Use of phenolic molding compounds with wood flour filler made a big jump to about 19,000 tons in 1945, due to a switch to general purpose molding from the war uses which required extra strength fillers such as cotton flock and cord. It took another considerable jump to 30,000 tons in 1946 and then really climbed to 80,000 tons in 1947. Wood filled molding compounds are still rising, said Mr. Norton, being produced at a rate of 100,000 tons per year during the month of March, 1948. The defense program may shift emphasis back to war products, increasing the use of laminates and decreasing the uses of wood flour filled molding materials, placing the emphasis on cotton flock and filled materials.

Pulp molds have risen gradually to 4,000 ton in 1947, according to his chart.

next three years—will be made with these overlays, using about 35,000 tons annually. It has been demonstrated that a stronger and more attractive plywood results from use of resin-impregnated overlays and it means inferior wood veneers can be used when the giant peeler logs of highest quality inevitably become more scarce.

One plywood company in Washington state is already using a low resin content pulp overlay. There is also the Welch process, using sawdust or groundwood with resin, pressed on the veneer.

Again in this section we have published estimates on uses of pulp and paper in laminates, and molds, etc., made by A. J. Norton, who has been closely identified with paper and pulp plastics on both the east and west coasts of U. S. He thinks low pressure laminating and pulp-

wood overlays will increase use of pulp and paper in plastics even faster than pulp molding or conventional laminating.

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CELLULOSE ESTERS AND ETHERS USED IN PLASTICS MOLDING INDUSTRY

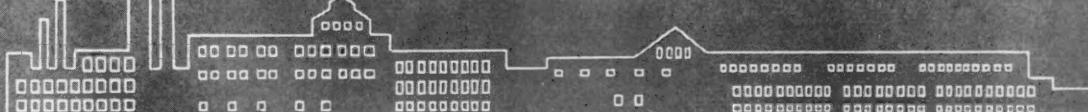
Ethylcellulose	
Ethocel	
Dow 2.310	
Celcon	
Nixon E. C.	
Hercules E. C.	
Cellulose acetate	
Bakelite	
Chemaco	
Herculoid	
Fibestos	
Kodakap	
Lumarith	
Nixonite	
Plastacel	
Tenite I	
Cellulose acetate butyrate	
Tenite II	
Cellulose nitrate	
Celluloid	
Hercules C. N.	
Kodaloid	
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Methocel	
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products, increasing the use of laminates and decreasing the uses of wood flour filled molding materials, placing the emphasis on cotton flock and filled materials, he says.

Plastics in Canada

In the field of plastics, probably the most significant development in Canada during the past year was commercial production of Arborite by Howard Smith Paper Mills in Quebec, as a result of research in lignin and its isolation from lignin used in alkaline pulping. The finished material consists essentially of lignin-enriched paper laminated into a hard, dense material under heat and pressure.

The company's research department in charge of Dr. George Tomlinson, vice president directing the research division, began its experiments during the war when it became apparent that synthetic resins might be in short supply.

Arborite is made from lignin filled paper made on a standard Fourdrinier paper machine, the lignin being incorporated by mixing it with the stock in the beater. The paper is then laminated by heat and pressure, at the same time incorporating into the laminate a decorative surfacing of colors. The result is a plastic wallboard impervious to normal household temperatures and repellent to water. Sales of Arborite totaled \$1,000,000 in 1947.

Los Angeles is Plastics Center; St. Regis Plastics Sales High

Los Angeles on the Pacific Coast is rapidly becoming one of the important plastics centers of the continent, as a result of the impetus of plastics uses in airplane manufacturing there.

One high pressure laminator (Taylor Fiber Co.) is now operating near Los Angeles and several low-pressure laminators are producing in the Southwest. U. S. Molding compounds derived from bark are now produced in Longview, Wash., by Weyerhaeuser Timber Co.

This report was made last year by St. Regis Paper Co., on its Panelyte (plastics) Division in New Jersey:

"A new high was set in shipments and dollar value of sales for 1946. A heavy tonnage of base material is being coated daily on a new 100-inch coating machine. Much of this base material is kraft paper produced in St. Regis mills. A new 120-inch press, one of the largest in the industry, will be ready for operation early in 1947.

"The pent-up demand for household electric refrigerators was reflected in the sales of Panelyte during 1946. The refrigerator industry continues to be the largest single buyer in Panelyte for inner doors, breaker strips, and door frames.

"The development by the company's engineers at the Trenton plant of methods of mass-production assemblies of Panelyte with metal, rubber, and other materials attached and hidden, is opening new markets.

"Introduced in 1946, Decorative Panelyte shows promise of supplementing the molded and fabricated parts as an important item in the expanding line of Panelyte products. Decorative Panelyte is supplied in nine attractive patterns and colors for manufactures of table tops, furniture and kitchen cabinets. There are many possible uses for Decorative Panelyte in the building construction field, and as conditions warrant, these will be explored.

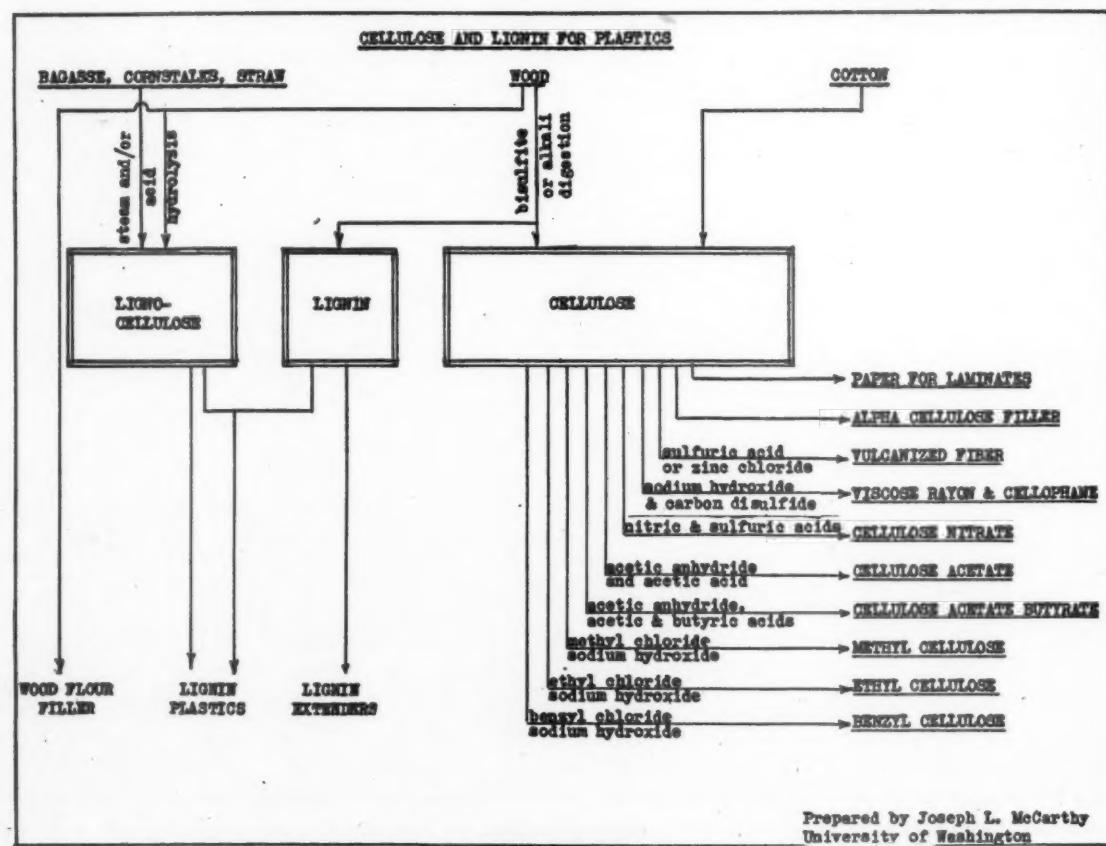
"Inherent qualities make Panelyte a 'must' for many applications in the automotive, chemical, electrical, furniture, maritime, paper mill, petroleum, radio, railroad and textile fields."

Ton of Paper Makes 140,000 News Pages

The American Newspaper Publishers Assn. figures that 140,000 full-sized newspaper pages can be produced from a ton of newsprint. This would figure down to 4666 copies of a 30-page newspaper per ton.

Prediction . . .

In regard to kraft pulp, it may be recalled that Martin Williams, of the University of Alabama, predicted in the past year that annual U. S. kraft pulp capacity would reach 7,000,000 tons by 1950.



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U. S. PLASTICS AND SYNTHETIC RESINS—SHIPMENTS AND CONSUMPTION—1945-47

The figures shown represent the quantities shipped and quantities consumed in producing plants. Consumption in this case refers to the quantity of plastics and resins which are manufactured and used by the reporting company or company division, and the shipments data represent the quantities which are shipped by the reporting companies to outside users or to non-producing company divisions or subsidiaries. While the shipments and consumption data are called for separately on the report form, they are combined for the purposes of this report, since in most cases separate statistics on shipments and consumption

cannot be shown without disclosing the operations of individual companies.

This table differs somewhat from previous data issued by the U. S. government, as shown in the 1942-1944 table below. But with certain combinations and, as qualified in footnotes, the statistics are approximately comparable with those released for previous years and months.

For example, figures on continuous sheeting (.003 gauge and upward) and "all other" sheets are comparable to the figures shown for cellulose acetate sheets, rods and tubes in reports below for 1942-1944, except that data for a small

amount of rods and tubes were formerly included. Since the separate data reported for cellulose acetate rods and tubes cannot be shown without disclosing the operations of individual establishments, they are excluded from these figures.

The statistics for cellulose molding and extrusion material include data for cellulose acetate and cellulose acetate butyrate material. Previously, no data on the consumption for producing companies of molding and extrusion material were collected. Statistics for nitrocellulose products are entirely comparable with those previously issued.

	(Totals shown in Pounds)						
	1945		1946		1947		
	June	September	Year 1945	January	Year 1946	January	December
Cellulose acetate and mixed ester plastics:							
Sheets:							
Continuous (under .003 gauge)	659,548	617,451	*4,103,541	591,872	7,649,795	816,954	475,043
Continuous (.003 gauge and upward)	372,583	377,785	9,788,567	524,883	7,498,529	636,257	614,081
All other sheets, rods and tubes	354,302	317,508	}	447,364	4,715,401	467,128	254,241
Molding and extrusion materials	5,151,393	5,344,463	61,123,062	6,689,778	83,204,045	7,656,594	3,829,623
Nitrocellulose plastics:							
Sheets:	747,340	735,514	9,210,894	905,696	10,932,131	1,051,751	627,630
Rods and tubes	520,123	486,640	6,418,166	608,576	7,228,862	545,121	213,928
Other cellulose plastics ¹ :	—	—	(6)	—	12,183,113	584,683	(6)
Phenolic and other tar acid resins:							
Laminating (dry basis)	3,558,660	1,717,022	*16,982,565	2,298,813	27,725,337	3,884,433	3,513,157
Adhesives (dry basis)	1,017,738	511,071	(3)	1,070,902	16,120,513	1,545,052	1,920,235
Molding materials ²	11,387,736	9,949,599	*70,728,135	10,739,472	140,216,443	14,736,607	17,160,488
All other (dry basis) ²	4,548,307	3,006,906	*22,936,272	4,415,637	58,201,169	6,814,636	5,067,639
Urea and melamine resins:							
Adhesives (dry basis)	2,970,291	2,227,825	*17,834,723	2,650,044	40,797,108	3,631,375	4,210,386
Textile and paper treating (dry basis)	547,061	734,133	(3)	1,071,084	13,534,368	1,510,363	1,634,764
All other (dry basis) ²	322,757	153,828	*1,740,559	235,687	**3,746,580	882,654	719,421
Polystyrene	5,898,006	1,712,417	8,207,092	2,728,623	66,769,321	7,431,671	11,455,593
Vinyl resins:							
Sheeting and film	1,355,902	1,185,090	13,713,264	1,569,044	52,079,495	6,196,557	8,094,122
Textile and paper coating (resin content)	2,122,082	1,366,602	8,426,502	1,650,026	11,673,212	1,237,297	2,182,831
Molding and extrusion materials ³	—	2,216,090	24,809,268	5,496,024	61,852,162	6,801,822	7,828,786
Adhesives (resin content)	2,170,949	224,513	8,152,076	399,177	27,082,895	3,096,480	2,297,927
All other (resin content) ²	665,568	—	325,491	27,082,895	3,096,480	—	—
Miscellaneous plastics and resins:							
Molding and extrusion materials ^{1,2}	10,569,934	3,067,259	(6)	4,647,572	(6)	5,631,342	4,540,150
All other (dry basis) ^{2,4}	3,553,389	2,614,375	17,651,384	2,630,148	35,689,921	2,558,976	2,641,584

Source—Chemicals Unit, Industry Division, U. S. Bureau of Census.

¹7 months only.

²11 months only.

³Includes filler, plasticizers and extenders.

⁴Excludes data for protective coating resins.

⁵Includes data for ethyl cellulose, urea and melamine, acrylic acid and miscellaneous molding and extrusion materials.

⁶Includes petroleum resins, acrylic acid ester resins, mixtures and miscellaneous synthetic resin materials.

⁷Comparable data not available.

⁸Cannot be shown without disclosing the operations of individual establishments.

U. S. CELLULOSE PLASTIC PRODUCTS: PRODUCTION, AND SHIPMENTS AND CONSUMPTION 1942-1944

(In Pounds)

	NITROCELLULOSE						CELLULOSE ACETATE		
	Total	Sheets		Rods		Tubes		Sheets, rods, and tubes	Molding composition
Production	Shipments and consumption	Production	Shipments and consumption	Production	Shipments and consumption	Production	Shipments and consumption	Production	Shipments
1942	15,128,826	16,038,188	10,422,370	10,838,323	3,662,075	3,819,016	1,044,381	1,380,849	7,453,307
1943	14,042,348	14,530,299	8,929,257	9,323,639	4,280,853	4,409,707	832,238	796,953	10,163,467
1944	—	—	—	—	—	—	—	6,777,324	40,792,518
January	1,275,119	1,209,993	791,671	770,263	409,823	377,964	73,623	61,766	798,925
February	1,443,101	1,318,505	920,365	793,903	450,050	472,650	72,486	51,952	721,952
March	1,468,320	1,479,146	931,996	917,163	459,720	480,003	76,604	81,978	646,137
April	1,474,637	1,511,507	947,496	951,989	431,395	467,117	93,746	92,401	676,416
May	1,456,855	1,469,530	882,587	897,395	484,628	483,626	89,640	88,509	762,307
June	1,468,681	1,561,850	907,405	943,928	448,191	505,433	113,085	112,489	704,136
July	1,198,118	1,291,518	726,664	774,303	381,927	419,223	89,527	97,992	736,111
August	1,382,746	1,319,348	894,642	820,133	396,356	410,655	91,748	88,560	730,922
September	—	—	—	—	—	—	—	—	731,818
October	—	—	—	—	—	—	—	—	5,007,831
November	—	—	—	—	—	—	—	—	4,504,670
December	—	—	—	—	—	—	—	—	—
8 mo. 1944	11,167,577	11,161,397	7,003,026	6,869,079	3,462,090	3,616,671	702,461	675,647	5,776,906
									6,158,418
									37,205,553
									34,060,878

¹Released as of March 2, 1945. For reasons of national security figures for late 1944 months and recent months were withheld.

Source: Bureau of Census.

CELLULOSE PLASTIC PRODUCTS—1942-44

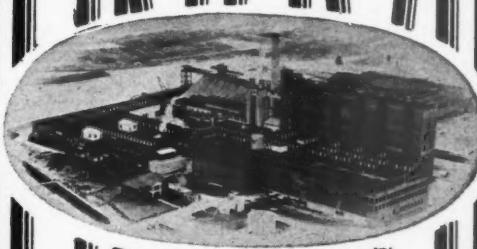
Data above are based on reports of 15 manufacturers which represent practically the entire industry. Nine manufacturers make cellulose nitrate products, six make cellulose acetate products and ten make cellulose acetate molding composition. Beginning October, 1943, data are included for two companies which produce cellulose acetate molding composition from scrap

material. While these companies were in operation prior to October, 1943, comparability of the data is little affected; in that month, they made no total shipments and accounted for only 2 per cent of total molding composition production. One additional company reported cellulose acetate sheets, rods and tubes for the first time in November, 1943. The production of this company is so small that comparability is unaffected.

The production, and shipments and consumption figures represent data reported by prime manufacturers of cellulose plastic material and

include no data for plastic molding which manufacture products from purchased material. This results in some understatement of the data for cellulose acetate sheets, rods and tubes. Manufacture of these products from purchased material, however, is reflected in the data here shown for shipments of cellulose acetate molding composition. The statistics shown for sheet forms do not contain data for safety glass sheeting. They may, however, contain data for some wrapping material, since the report form does not specify that such should be excluded.

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Wood Pulp vs. Linters ALL U. S. RECORDS BROKEN

ALTHOUGH it is estimated to have hit the two billion pound mark in 1947, world rayon production was still substantially behind its peak levels of the 1941-43 period. But in North America new record heights were reached, with expansion in Canada, the United States and Mexico.

Both on the world-wide scale and on this continent, the use of wood pulp as the principal raw material in manufacture of rayon has far exceeded all past records. This is known to be definitely true in nearly every country with reports of

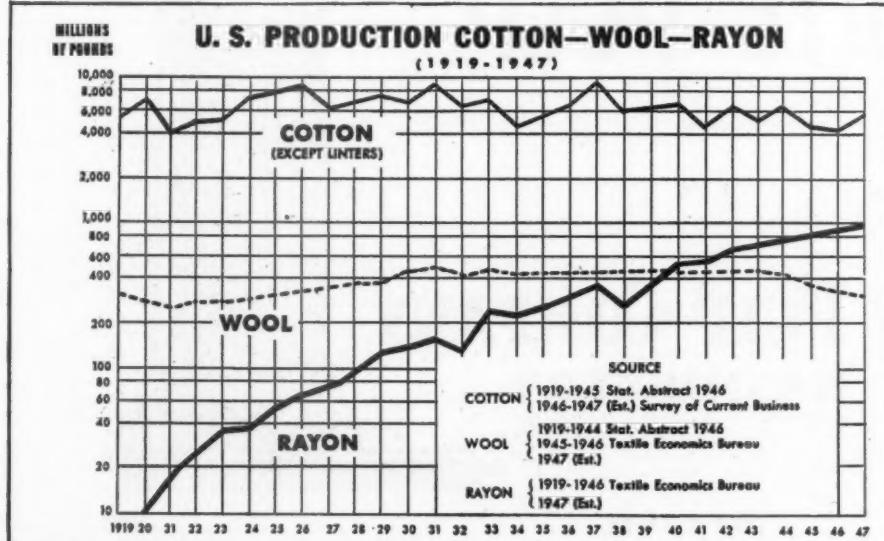
greater conversion of wood pulp to this purpose. The figures for the United States are again available for this Review Number, and these are truly spectacular. This country is now making 49% of the world's total rayon.

The 16 rayon companies of the United States used 481,000 tons of refined cellulose in making 975,100,000 lbs. of rayon in 1947. In both cases this was a tremendous increase over the respective figures of 428,000 tons and 853,900,000 lbs. for 1946, the previous record. Use of refined cellulose was more than twice what it was

ANNUAL FIBER CONSUMPTION IN THE UNITED STATES (Units are Millions of Pounds and Percent)

	COTTON Pounds	WOOL Pounds	RAYON Pounds	SILK Pounds	TOTAL Pounds	%
1920	2,828.1	88.9	314.2	9.9	8.7	0.3
1930	2,610.9	85.0	263.2	8.6	118.8	3.9
1935	2,754.7	78.9	417.5	11.9	259.0	7.4
1940	3,953.6	81.0	411.1	8.4	482.0	9.9
1943	5,258.3	80.4	628.0	9.6	656.2	10.0
1944	4,787.5	78.3	623.9	10.2	704.8	11.5
1945	4,508.2	76.1	648.2	10.9	767.5	13.0
1946	4,844.9	74.8	748.4	11.6	875.4	13.5
1947	4,701.7	73.6	698.0	10.9	987.9	15.4

Source: Rayon Organon.



Three New Rayon Plants in Mexico

Mexico now has four rayon plants, whereas a year ago it had only one. That was Artisela Mexicana, in Mexico City, making about 1,000,000 lbs. viscose rayon yarn annually since 1942.

A new acetate yarn plant, Celanese Mexicana, at Ocotlan, Jalisco, will make over 6,000,000 lbs. A new viscose plant, Viscosa Mexicana, at Zacapecu, Michoacan, being made ready for start-up when a PULP & PAPER editor visited the country, will make over 10,000,000 lbs.

All three of these plants are affiliated with Celanese Corp. of America. The fourth plant, also viscose process, is Celulosa Derivativa, in Monterrey, owned locally, and making 500,000 lbs. annually. It started up eight months ago.

in 1940 and more than three times what it was in 1936!

This refined cellulose was 83% wood pulp and only 17% cotton linters in 1947. Back in 1934 it was 56% wood pulp and 44% cotton linters. A total of 401,000 tons of wood pulp was used in 1947—78,000 tons more than in 1946, 104,000 tons more than in 1945, more than twice the usage in 1940 and almost five times the amount used in 1935! A year ago we published a forecast that the 400,000 mark would not be reached until March 1948 and it already has been surpassed, and the forecast that consumption would reach the rate of 425,000 tons in the fall of 1948 already has to be revised radically upward. A 15% increase in U. S. rayon producing capacity in just two years is now indicated.

No wonder the paper industry is feeling the competition for wood pulp supply, and these figures do not include the pulp used in plastics, cellophane and related products.

In the wood pulp versus linters "contest," the linters lost ground in all divisions of the dynamic rayon manufacturing industry. For viscose-cupra yarn, the use of wood pulp increased from 78% to 87%. Wood pulp is now being used almost entirely for the regular tenacity types of yarn and staple fiber. For intermediate types, the practice of rayon plants vary—from using 100% wood pulp to blends of wood pulp and linters and on to 100% linters.

Because both viscose and cuprammonium rayon is 100% regenerated cellulose, one pound of finished viscose yarn, including normal waste, requires somewhat over one pound of cellulose pulp.

In the acetate process, the use of linters increased slightly, but the use of wood pulp increased even more—from 63% to 69% wood, while linters slid off to 31%. About two-thirds of finished acetate is cellulose, the rest being the acetyl radical which is in intimate combination with the cellulose.

During the past year the rayon industry has supplied about 50% of the cord requirements of the tire manufacturers. This is made from high tenacity viscose yarn. The other 50% is made from cotton, which only a few years ago was the only source of tire cord.

The rate of operation in the tire industry has continued at an extraordinarily

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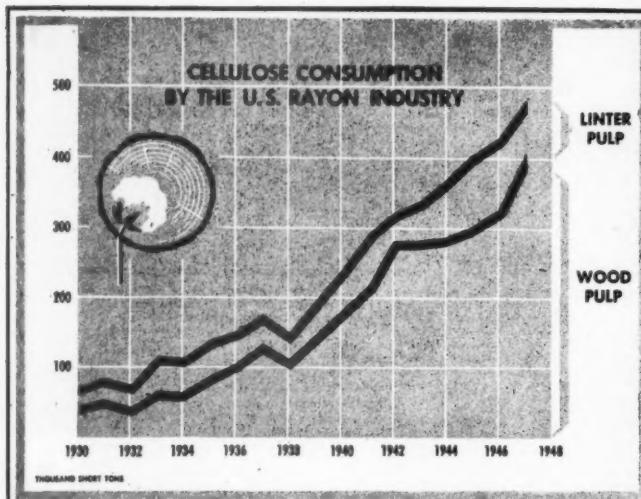
Our intimate world-wide affiliations—branch offices and personal representatives—gear this international organization to the making of "time". Time, and timeliness, as the industry well knows, spell profits in the distributing and marketing of paper and woodpulp.

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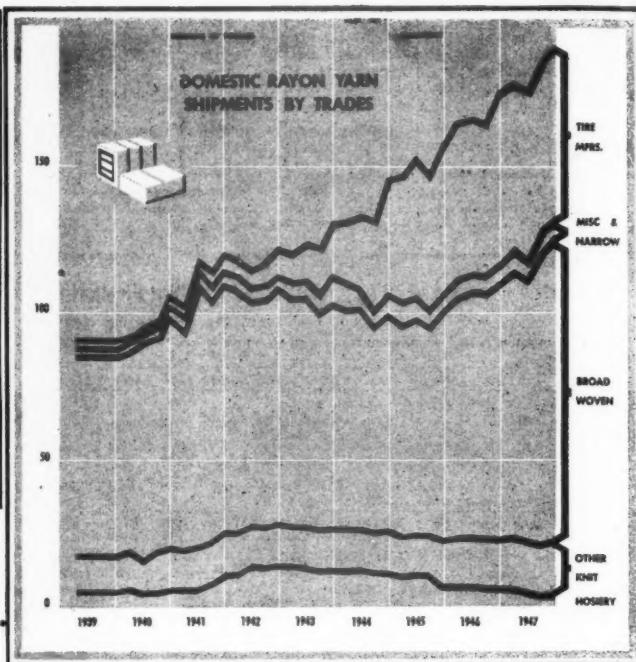
NEW YORK 17, N. Y.



This chart shows how wood pulp has crowded out cotton linters as raw material for rayon. Use of wood pulp reached 83% in 1947.

Chart on right greatly increased use of rayon tire cord.

Source: Rayon Organon.



high level throughout the year even though the deferred demand for tires due to the war was satisfied by April, 1947. Forecasts for 1948 and succeeding years indicate a production level that is very close to the present one. With rayon tire yarn offering quality, operational and cost advantages in tires, the tire industry continues to request additional amounts in preference to cotton cord and thus demands increase for wood pulp for this purpose.

Textile Industry Influenced

The most important single factor in the evolution of the modern textile industry unquestionably has been the de-

velopment and growth of the chemical fiber industry, it is pointed out in a bulletin issued by Celanese Corp. of America, a company which is building its own pulp mill in British Columbia.

This bulletin credits the chemical fibers with not only contributing to expansion of the textile industry, but also changing its basic nature and strengthening it by making possible:

1. Improved and diversified weaves and textures, enhancing the attractiveness and greater utility. Incidentally, blending of chemical and natural fibers is one of the fastest-growing and most productive practices in the textile industry, it said.

2. Increased versatility in textile mill operations. The chemical fibers have greatly lengthened selling seasons and thereby rounded out production. Wool is blended with chemical fibers to produce lighter fabrics and cotton is blended with these versatile fibers to produce fabrics suitable for an extended season.

3. Reduced cost of raw materials. The chemical fibers offer competitive price advantages over the natural fibers, particularly in recent markets. For example, as of January 7, 1948, Celanese 150 denier filament yarn was 74¢ per pound; comparable textile yarns of natural fibers were \$1.00 per pound for cotton yarn, \$3.25 per pound for worsted yarn.

4. Stability of price. Due to crop con-

CELLULOSE CONSUMPTION BY THE U. S. RAYON INDUSTRY

Short Tons of Refined Cellulose

	TOTAL PULP		WOOD PULP*		RAW COTTON LINTERS PULP* LINTERS†		
	Tons	Per Cent	Tons	Per Cent	Tons	Per Cent	Bales
1930	72,000	100	45,000	62	27,000	38	115,000
1931	84,000	100	53,000	63	31,000	37	132,000
1932	74,000	100	43,000	58	31,000	42	132,000
1933	115,000	100	65,000	57	50,000	43	213,000
1934	112,000	100	63,000	56	49,000	44	209,000
1935	137,000	100	86,000	63	51,000	37	218,000
1936	151,000	100	104,000	69	47,000	31	201,000
1937	176,000	100	132,000	75	45,000	25	187,000
1938	147,500	100	110,000	75	40,000	25	160,000
1939	194,500	100	145,000	75	53,000	25	211,000
1940	238,000	100	178,000	75	60,000	25	256,000
1941	287,500	100	214,500	75	73,000	25	312,000
1942	330,000	100	280,500	85	49,500	15	211,000
1943	336,500	100	281,000	84	55,500	16	237,000
1944	367,000	100	285,000	78	82,000	22	350,000
1945	400,000	100	297,000	74	103,000	26	438,000
1946	428,000	100	323,000	75	105,000	25	462,000
1947	481,000	100	401,000	83	80,000	17	353,000

*Wood and linters in purified form as used by rayon producers.

†Bales of raw cotton linters figured on the basis of one-third overweight on refined linters pulp (due to refining losses) and converted to bales on the basis of 625 pounds net weight per bale.

Source: Rayon Organon.



CELLULOSE ► is dependably uniform

Rayonier's wood cellulose is supplied in several grades to provide the special characteristics required for manufacture of the various types of products in which cellulose is used.

Quality control in production of these high-alpha grades of cellulose assures the constant purity and uniformity required in making viscose and acetate fibers, cellophane, and various cellulose derivatives.

In addition to development of new and improved grades of wood cellulose, one of the principal functions of our research staff is the study of the processing characteristics of our products under conditions similar to those found in our customers' plants.

Principal Grades of Rayonier Wood Cellulose



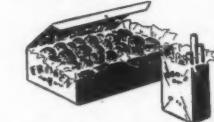
"RAYACETA" is a highly purified wood cellulose specially developed for the production of cellulose acetate fibers. It also is used in the manufacture of acetate films and sheets for packaging purposes.



"RAYOCORD" wood cellulose is a highly purified product especially suitable for the production of viscose yarns of high tensile strength. It is widely used in the manufacture of tire cords and for textile yarns where maximum strength is desired. It is also a good material for the production of saturating papers and vulcanized fiber.



"HICOLOR" is an established grade of purified wood cellulose for the production of viscose fibers and yarns of high quality. It is also used as a base material for vulcanized fiber and related products.



"RAYAMO" is a wood cellulose specially developed for the making of cellophane, used increasingly as a protective covering for fruits, vegetables, cigarettes, candy, and numerous other packaged articles.

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MILLS: Hoquiam, Port Angeles, and Shelton, Washington; Fernandina, Florida.

WORLD RAYON PRODUCTION

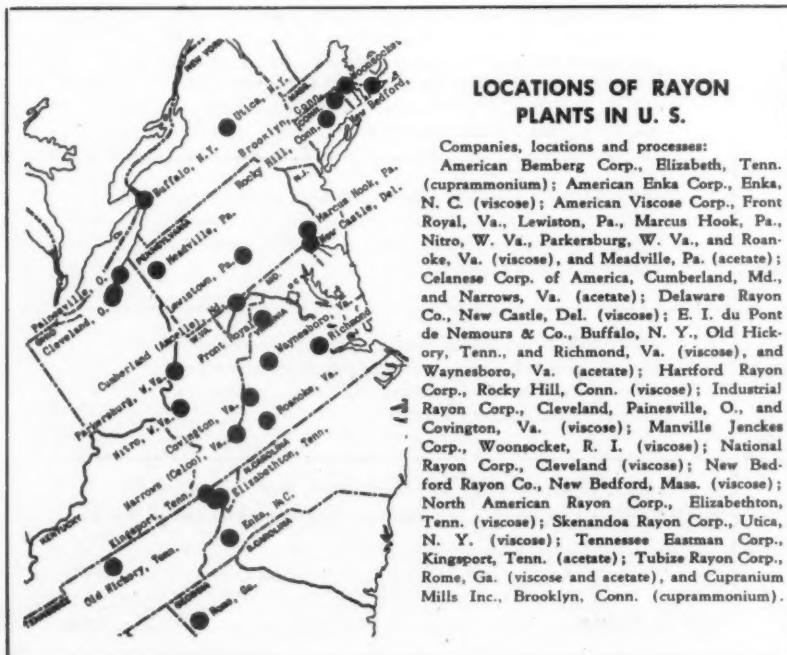
Thousands of Pounds

	Filament Yarn	Staple Fiber	Total Rayon
1890	30	*	30
1900	2,200	*	2,200
1905	11,100	*	11,100
1910	17,600	*	17,600
1911	18,700	*	18,700
1912	19,800	*	19,800
1913	25,195	*	25,195
1914	19,700	*	19,700
1915	18,500	*	18,500
1916	23,400	*	23,400
1917	24,200	*	24,200
1918	25,900	*	25,900
1919	27,800	*	27,800
1920	33,100	*	33,100
1921	48,200	*	48,200
1922	76,590	*	76,590
1923	102,990	*	102,990
1924	138,285	*	138,285
1925	185,290	*	185,290
1926	211,735	*	211,735
1927	295,095	*	295,095
1928	360,550	*	360,550
1929	434,215	7,185	441,400
1930	451,200	6,250	457,450
1931	499,665	7,980	507,645
1932	517,300	17,285	534,585
1933	663,395	27,895	691,290
1934	772,525	51,835	824,360
1935	941,055	139,575	1,080,630
1936	1,023,305	298,595	1,321,900
1937	1,203,105	620,955	1,824,060
1938	991,475	959,735	1,951,210
1939	1,150,425	1,149,440	2,299,865
1940	1,183,760	1,279,700	2,463,460
1941	1,267,025	1,492,080	2,759,105
1942	1,213,170	1,536,985	2,750,155
1943	1,165,885	1,467,350	2,633,325
1944	1,039,630	1,116,910	2,156,540
1945	934,000	596,000	1,530,000
1946	1,103,000	569,000	1,672,000
1947	1,290,000	710,000	2,000,000

Courtesy: Rayon Organon.

LOCATIONS OF RAYON PLANTS IN U. S.

Companies, locations and processes:
 American Bemberg Corp., Elizabeth, Tenn. (cuprammonium); American Enka Corp., Enka, N. C. (viscose); American Viscose Corp., Front Royal, Va., Lewiston, Pa., Marcus Hook, Pa., Nitro, W. Va., Parkersburg, W. Va., and Roanoke, Va. (viscose), and Meadville, Pa. (acetate); Celanese Corp. of America, Cumberland, Md., and Narrows, Va. (acetate); Delaware Rayon Co., New Castle, Del. (viscose); E. I. du Pont de Nemours & Co., Buffalo, N. Y., Old Hickory, Tenn., and Richmond, Va. (viscose), and Waynesboro, Va. (acetate); Hartford Rayon Corp., Rocky Hill, Conn. (viscose); Industrial Rayon Corp., Cleveland, Painesville, O., and Covington, Va. (viscose); Manville Jenckes Corp., Woonsocket, R. I. (viscose); National Rayon Corp., Cleveland (viscose); New Bedford Rayon Co., New Bedford, Mass. (viscose); North American Rayon Corp., Elizabeth, Tenn. (viscose); Skenandoa Rayon Corp., Utica, N. Y. (viscose); Tennessee Eastman Corp., Kingsport, Tenn. (acetate); Tubize Rayon Corp., Rome, Ga. (viscose and acetate), and Cupramonium Mills Inc., Brooklyn, Conn. (cuprammonium).



ditions, speculative influences and other market factors, the natural fibers are subject to wide price fluctuations. By contrast, the chemical fibers are remarkably stable in price. Production can be planned on the basis of uniform quality and known costs.

All these essential factors have contributed to the healthy growth of the chemical fibers to where they comprised in 1947 nearly 14% of all fibers for textile use, being exceeded in volume only by cotton.

Survey of Rayon Expansion

A recent survey of the United States rayon producing industry (by Rayon Organon, published by the Textile Economics Bureau, 10 East 40th St., New York 16) discloses an expected overall poundage increase of 15% in plant capacity during the next two years. On an annual basis, the industry's capacity by October 1949 is planned to total 1,175 million pounds, which compares with a present operating capacity of 1,022 million pounds. The greatest increase is programmed by the acetate division of the industry where yarn plus staple capacity by late 1949 is expected to reach an annual rate of 422 million pounds or 32% above the current level. Over the same period, viscose+cupra yarn and staple capacity is projected to 753 million pounds, a 7% increase over present output.

Over the next two years, much of the industry's increased capacity will come from the extension and refurbishing of facilities at existing plants. However, two new rayon producing plants will also come into production during this period, namely, the viscose heavy denier, high tenacity yarn plant of the American Enka Corporation at Lowland, Tennessee and the acetate rayon plant of the Celanese Corp. of America at Rock Hill, S. C. On the other hand, the projected rayon staple plant of the American Viscose Corporation at Radford, Va., and the viscose rayon plant of the Industrial Rayon Corp., at a site not yet named, are not included because they are not expected to be in operation within the next two years.

The expected expansion plans of the rayon industry over the next two years may be summarized as follows. Textile yarn capacity, all processes, is programmed to increase from the present annual rate of 532 million pounds to 627 million pounds or by 18%. Of this 95 million-pound increase, 83% will be acetate yarn and 17% viscose+cupra yarn. Over the same period, viscose high tenacity yarn capacity is expected to increase to 270 million pounds, which is 37 million pounds above the current level. Finally, total staple and tow capacity, all processes, is planned to reach 277 million pounds by July 1948 or 8% above the present rate; between mid-1948 and late 1949, only a very small further addition to staple capacity is programmed.

Consumption of Textile Fibers

Total 1947 consumption of the four principal textile fibers (cotton, rayon,

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Western Hemlock Wood at the
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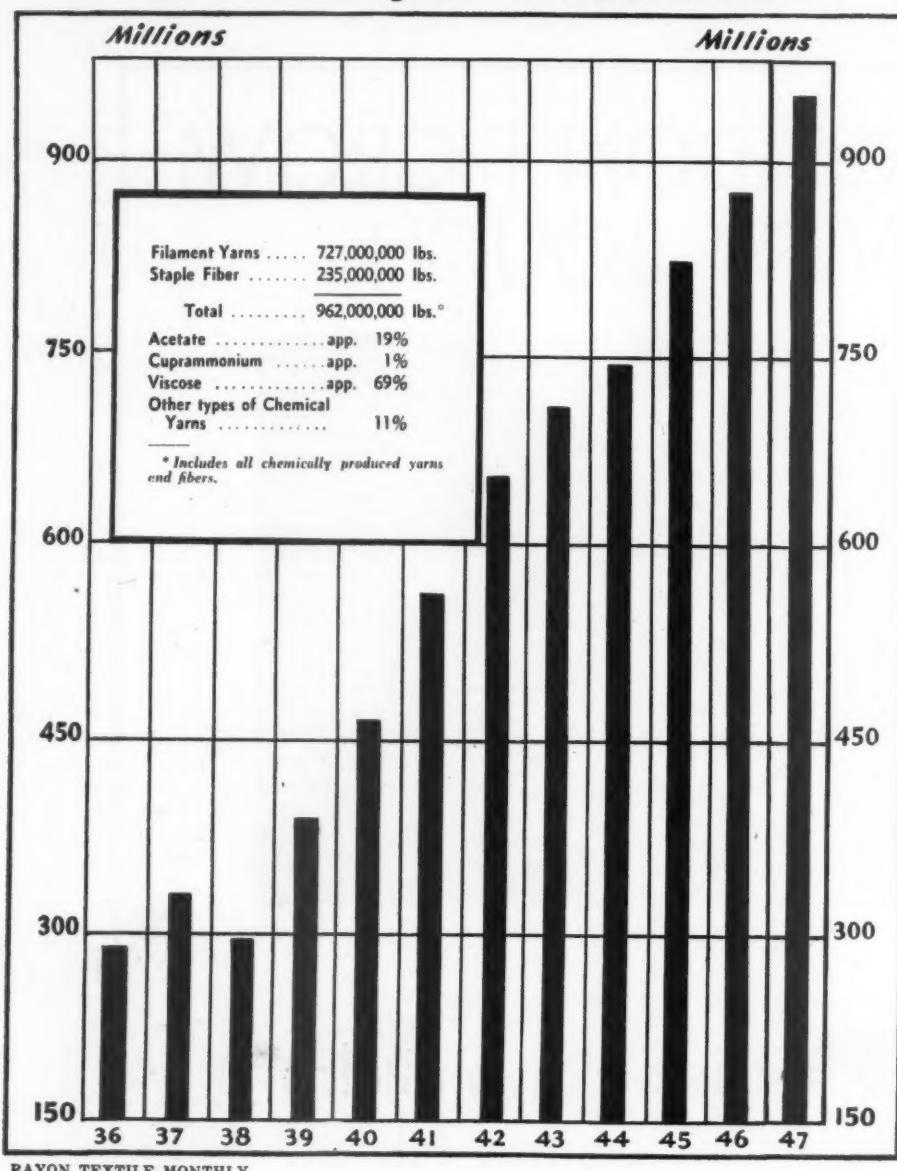
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**BRITISH COLUMBIA
PULP & PAPER COMPANY**

LIMITED

VANCOUVER, CANADA

U. S. A. Rayon Production



RAYON TEXTILE MONTHLY

U. S. RAYON STATISTICS

(in millions of lbs.)

Year	—PRODUCTION—			—CONSUMPTION—		
	Filament Yarn	Staple Fiber	Total	Filament Yarn	Staple Fiber	Total
1930	127.3	0.4	127.7	118	1	119
1939	328.6	51.3	379.9	362	96.5	458.5
1941	451.2	122.0	573.2	452.4	133.6	586
1943	501.1	162.0	663.1	494.2	162.0	656.2
1945	624.1	168.0	792.1	602.4	164.9	767.3
1946	677.5	176.4	853.9	666.5	208.3	874.8
1947	746.7	228.4	975.1	729.2	258.9	988.1

CANADIAN RAYON PRODUCTION AND IMPORTATIONS

(1925 to 1945—In Pounds)

	Yarn Production	Yarn Imports	Staple Fiber Imports	Total Consumption
1925	507,528	1,851,402	-----	2,359,030
1930	4,627,327	2,383,794	-----	7,011,121
1935	13,215,617	1,214,656	-----	14,430,273
1940	19,637,869	3,482,255	4,180,609	25,574,864
1945	21,100,000	7,584,477	6,841,301	35,525,748
1947	25,421,000	7,479,949	12,507,870	44,408,819

Does not include imports of military tire yarns.

wool and silk) by the United States textile industry amounted to 6,399,100,000 pounds, a figure only 1% under 1936 and 7% below the 1942 war-engendered peak. Some appreciation of the magnitude of 1947 textile fiber consumption is afforded by its comparison with average consumption in the 1935-1939 period. Last year the four-fiber total was 58% above the average of this pre-war period, while consumption of the individual fibers showed the following percentage changes over this same period: rayon +195%, raw wool +85%, raw cotton +43%, raw silk -95%.

This country's consumption of rayon filament yarn and staple last year reached a new peak of 987,900,000 pounds, 13% above 1946 and more than double the 1939 total. Compared with 1946, rayon filament yarn consumption increased 9% and staple by 24%. Imports of rayon filament yarn in 1947 were nominal; in the case of rayon staple, however, imports comprised 14% of total consumption.

The great expansion in this country's consumption of rayon over the last decade is demonstrated another way by the following data. For every one pound of rayon consumed in 1937, 12 pounds of raw cotton, 1 1/4 pounds of raw scoured wool and 0.2 of a pound of raw silk were consumed. By 1947, these figures had changed to 4.8 pounds of raw cotton and 0.7 of a pound of raw wool consumed to each pound of rayon, silk being nominal.

Britain's Rayon Output

According to the Board of Trade, Great Britain's 1947 output of rayon and nylon filament yarn plus rayon staple and waste reached a total 203,000,000 pounds, a new record which exceeded 1946 production by 13%.

Japanese Rayon Production

According to reports, SCAP intends to push ahead its plans to reestablish the Japanese rayon producing industry as an important factor in the world rayon market. The current revitalization program calls for the accomplishment of the following objectives: (1) rehabilitation of the rayon producing industry to a total capacity (yarn and staple) of 330 million pounds, from which an annual average output of 308 million pounds can be obtained; (2) eventual attainment of an annual domestic per capita consumption goal of 1.4 pounds of rayon filament yarn and 1.3 pounds of staple; (3) establishment of annual consumption of 1/4 million pounds of rayon staple for industrial uses; and (4) increasing the annual export level of filament yarn products to 60 million pounds and rayon staple products to 30 million pounds.

The rebuilding of Japan's rayon output to an annual level of 308 million pounds a year means that the industry will eventually be restored to the extent of 57% of the peak 1938 output level of 541 million pounds. Most of the rehabilitation will be concentrated in the filament yarn section.

MORE FIBERS FOR PULP AND PAPER

(Continued from Page 61)

amounts of magnesium acid sulfite liquor, the cooks being made for 2.5 and 3.5 hours at 140 degrees Centigrade. Yields of crude pulp and screenings decreased regularly, while screened pulp yield increased, with the increase in pulping chemicals. Because the ammonium bisulfite process is used for the commercial production of wood pulp in a Scandinavian mill and in one U. S. mill, a brief series of cooks was made with these volatile liquor bases. The ammonium bisulfite liquors gave essentially the same results on wheat straw that were obtained with magnesium bisulfites under similar conditions. Said Mr. Aronovsky and his associates:

"It is easily evident that the largest pulp yields are produced by the neutral sulfite process and the smallest by the soda process. The kraft pulp yields are somewhat higher than those produced by soda pulping. However, the strength characteristics are in the reverse order, with soda pulps being generally the strongest, the neutral sulfite pulps the weakest, and the kraft pulps having intermediate strength properties. The bursting and tensile strengths and the folding endurance of the alkali straw pulps are higher than those of commercial softwood sulfite pulp, while the properties of the neutral sulfite straw pulp approach closely those of the commercial sulfite wood pulp. It may be noted that the tear resistance of the straw pulps were fairly uniform regardless of the types and amounts of alkaline chemicals used for pulping. The uniform but low tear re-

Estimated Production of Wheat Straw in Major Wheat-Growing States

In Thousands of Tons

	1947
Ohio	3,432
Indiana	2,507
Illinois	1,997
Michigan	2,086
Minnesota	1,444
Iowa	228
 Total Corn Belt	 11,694
North Dakota	10,223
South Dakota	3,754
Nebraska	6,321
Kansas	20,069
 Total Great Plains	 40,367
Oklahoma	7,331
Texas	8,699
 Total Southwest	 16,030
Montana	4,503
Idaho	2,655
Colorado	4,134
Washington	4,533
Oregon	1,513
 Total Far West	 17,338
Total Wheat Belts	85,429
Total U. S.	95,544

sistance of these pulps is due mainly to the relative shortness of the straw fibers.

"The straw pulps produced with magnesium or ammonium bisulfite were obtained in yields intermediate between those of the soda process and kraft process pulps. The strength properties of the bisulfite pulps were considerably lower than those of the pulps obtained with the

alkaline or neutral pulping agents. Perhaps the high silicious ash contents of the acid pulps are responsible for their relative brittleness. Possibly also the hardness of these pulps and their resistance to hydration, as evidenced by the relatively long beating periods required, may be due to their low pentosan contents. At any rate, the data show that acid pulping processes are not suitable for the production of satisfactory papermaking pulps from wheat straw or, by analogy, from other high-silica agricultural residues."

They listed these conclusions:

"(1) Pulping with ammonia is impractical, under the conditions employed in these experiments, mainly on account of the large amounts of this reagent required. (2) The acid pulping processes produced relatively weak and brittle pulps from straw and they are apparently unsuitable for use on agricultural residues of high silica content. (3) The neutral sulfite process produced the highest pulp yields from wheat straw, and the kraft process gave somewhat higher yields than the soda process. (4) The strongest pulps were produced by the soda process, followed closely by the kraft pulps, and then by the neutral sulfite pulps. (5) Bleaching resulted in a lower loss of fiber from neutral sulfite pulp than from soda or kraft pulp. (6) The bleached agricultural residue pulps had better strength properties, with the exception of tensile strength, than the unbleached pulps, and the largest increase in strength on bleaching was evidenced by the neutral sulfite pulps."

Research With Wheat Straw

The same NRRL research men and Dr. Lathrop made a study of agricultural residue pulps

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CHEMICALS and RAW MATERIALS

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from the standpoint of high-yield straw pulps for fine papers. It was admitted at the start of the study that the lower cellulose content and the consequently lower yields put the materials at a disadvantage when compared with wood. However, the neutral sulfite process, giving high yields of relatively strong and easy bleaching pulps from agricultural residues, should, these experts say, overcome the disadvantage.

In planning their attack on the problem, the researchers noted that the total carbohydrate fraction (termed *holocellulose*) of these residues was approximately the same as that found in wood, whereas the residues contained less alpha-cellulose, they had a larger content of holocellulose, mainly *potosans*, than generally occur in wood.

The pulps were prepared from the Kawvala straw in the manner previously described. The procedures used were all TAPPI methods. One additional modification was incorporated in the method for determining lignin in bleached pulps: the bleached pulp was hydrolysed for two hours with a 2-per cent solution of sulfuric acid at boiling temperature, and the hydrolyzed residue was dried and then treated with 72-per cent sulfuric acid in the usual manner.

The difference in the chemical analyses and pulping characteristics of the two streams and in the properties of the pulps derived from them "are exaggerated somewhat by the fact that one of these straws was slightly weathered," they said.

"It is impractical to expect that all of the straw, required annually for the manufacture of pulp and paper, can be obtained in a completely sound and unweathered condition and stored without change," said their paper. "The possibility of meeting a mill's requirements with straw of one particular variety and from one particular location is also remote, since the number of wheat varieties grown in any one section of the country is quite large and variable. A small difference in the behavior of straws produced in different localities and under different cultural and climatic conditions is to be expected. This difference is also encountered with pulpwoods and should entail no particular difficulty in pulp and paper production; such variations can be smoothed out

fairly well by suitable blending of the straws, or preferably of the pulps produced from these straws, a practice that is commonly used in wood pulp production."

The preliminary results obtained by pulping straw with sodium sulfite show the advantage of adding sodium bicarbonate. A series of cooks was therefore run in which the sodium sulfite was kept constant at 8 per cent of the weight of dry straw and to which different amounts of sodium bicarbonate were added. The results show that the addition of sodium bicarbonate had beneficial effects on the yields of screened pulp and on the chemical and strength characteristics of the pulps. Stronger pulps with lower bleach requirements were obtained with the increased amounts of bicarbonate in the cooking liquors. The use of bicarbonate improved the brightness of the unbleached pulp. It was noted that the strength properties of the pulps are more or less directly tied in with the pH of the spent cooking liquor. This may be due to the lower degree of delignification of the pulp fibers, as well as to a reduction in the pentosan content of the pulp as a result of the relatively greater acidity of the pulping liquor.

With sodium carbonate in amounts equivalent to the sodium bicarbonate previously used, somewhat lower yields of screened pulp and slightly larger amounts of screenings were obtained. The sodium carbonate-cooked pulps contained a little more ash than those prepared with sulfite and bicarbonate, but the other chemical characteristics were approximately the same. The strength properties of the carbonate- and bicarbonate-treated pulps were approximately the same. It is apparent from these data that the economic advantage of sodium carbonate over the bicarbonate outweighs the slight superiority in quality of the pulp produced with bicarbonate.

The associates at NRRL indicated that there was a trend towards decreased yields of screened pulp and toward slightly better pulp quality as the sodium carbonate in the cooking liquor was increased from 2 to 6 per cent of the weight of straw. Although the actual increase in strength characteristics of the pulp made with more than 2 per cent carbonate is probably insufficient to warrant the cost of additional chemical, the use of 3 per cent instead of 2 per cent carbonate may be advis-

able from the standpoint of added insurance against too low a pH value of the liquor at the end of cooking and against its possible corrosive effects on the pulping equipment.

The results of increasing the sodium sulfite in the cooking liquor showed that, the pH of the used pulping liquor increased regularly with increasing chemical up to 7 per cent sodium sulfite; no appreciable increase in pH of the used liquor was noted with the larger amounts of chemical. The yields of screened pulp seemed to be more or less unaffected by the increase in sodium sulfite from 3 to 10 per cent of the weight of straw, although the amounts of screenings produced decreased somewhat. The lignin content and bleach requirement (to brightness 70) of the pulps decreased regularly with increasing sodium sulfite used for pulping.

The strength characteristics of the pulps, particularly the bursting and tensile strengths, increased with increasing concentration of chemical up to about 6% sodium sulfite; beyond this concentration no particular trend was noted. Since the tear resistance of these pulps was relatively low anyway, the variations in tear values obtained in this series of cooks have no particular significance.

It is apparent from these data that 6 to 8% sodium sulfite produced pulps in high yield and with good strength properties. The pulp prepared with 6% sodium sulfite and 3% sodium carbonate should be satisfactory for use in unbleached papers. For bleached pulps, however, it would probably be preferable to use 8% sodium sulfite owing to the much lower bleach requirement of the pulp produced with the larger amount of chemical.

Increasing the time of cooking when using the neutral sulfite process, with all of the other pulping conditions held constant, had a distinctly deleterious effect on the resultant pulp.

It had been established from previous work that pulping straw for two hours at temperatures lower than 170° C. gave raw pulps. In order to obtain usable pulps with the neutral sulfite process at the lower temperatures, a cooking period of 4 hours was used for this series, keeping all the other pulping conditions constant. The data show that under these conditions a cooking temperature of 160° C. was optimum, giving larger yields of screened pulp with higher bursting strength. As the temper-

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ture was reduced to 150° C. the yield of screened pulp dropped and the screenings increased considerably. In general, however, the pulp had better strength characteristics at the lower cooking temperature.

It was apparent that cooking for 4 hours at 160° C. gave results similar to those obtained with 2 hours at 170° C. This indicated that the process of pulping straw with a mixture of sodium sulfite and sodium carbonate might approximate a chemical reaction of the first order, as in the pulping of wood. In order to check this point, a cook was made on wheat straw for 8 hours at 150° C. The pulps from these three cooks had approximately the same chemical and physical strength characteristics. The yields of screened pulp and screenings showed a slight tendency to increase with decreasing temperature and increasing time of cooking, but the actual differences between these values for the three cooks were very small. Pulping straw with neutral sulfite therefore approximates a chemical reaction of the first order in which the reaction velocity doubles for each 10° C. rise in temperature.

All the foregoing cooks were made in cylindrical, 12-gallon tumbling autoclaves. To determine if similar results would be obtained on a larger scale, two cooks were made in a spherical rotary autoclave with an internal diameter of 3 feet. Approximately six times as much straw could be cooked in this autoclave as in the cylindrical units. One cook was made by indirect heating with 8 per cent sodium sulfite and 3 per cent sodium carbonate, with the other pulping conditions the same as for the smaller cooks. In the other cook direct steaming was applied, and the ratio of total liquid to straw placed in the autoclave was 4 to 1. This cook was run for 8 hours at 150° C. At the end of this cooking period the ratio of total liquid to original straw was approximately 12 to 1, due to condensation of the steam used for cooking. When cooking in this large autoclave was completed the pressure was reduced to atmospheric by relief, and the cooked residue was removed and defibered in a beater before screening. Slightly larger yields of screened pulp were obtained from the spherical autoclave than from comparable cooks made in the smaller cylindrical units, but the physical strength characteristics of the pulps made in the spherical autoclave were somewhat lower.

Single- and three-stage bleaches were carried out on the pulp from a cook in a spherical autoclave, 8% sodium sulfite plus 2% sodium carbonate, 8 hours at 150° C., at different consistencies. The data showed that three-stage bleaching produced a pulp with higher brightness and generally higher strength characteristics, particularly folding endurance. In this respect chlorination at low consistency, and extraction with alkali and hypochlorite treatment at high consistency, gave results superior to those produced by three-stage bleaching at low consistency. Although the fiber loss by the combined low- and high-consistency, three-stage bleaching method was slightly higher than that from the low consistency procedure, the former method was used for the bleaching studies because of the higher brightness and quality of the bleached pulp.

The data on bleaching several pulps produced with 8% sodium sulfite plus 2 to 3% sodium carbonate at 170° C. for 2 hours showed results in close agreement with those previously reported for bleached neutral pulps.

The comparison of the strength characteristics of bleached neutral sulfite wheat straw pulp with those of commercial bleached hardwood soda and softwood sulfite pulps made evident that the wheat straw pulp compared favorably with the softwood sulfite pulp and was considerably stronger in all respects than the hardwood soda pulp. The high yield and relatively high quality of the bleached neutral sulfite wheat straw pulp should make this product particularly suitable for blending with other papermaking fibers in the manufacture of specialty papers.

The NRRL conclude that "the sporadic and scattered attempts to produce usable pulps from agricultural residues by the sodium sulfite process have not met with success mainly because the investigations were neither concerted

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enough nor planned well enough, from the technological as well as the economic viewpoint, to develop the optimum procedures and products." They do not claim that their process development may be regarded as completed, they do feel that the data obtained "are sufficiently promising and interesting to merit serious consideration of neutral sulfite straw pulp for fine specialty papers by the pulp and paper industry." The stress that they do not suggest that the neutral sulfite straw pulp is an all-purpose product suitable by itself for any kind of paper. "Rather," they state, "this pulp should be used as one ingredient in a blend, to which this pulp contributes properties not so easily or so well provided by other pulps."

They believe that the relatively short but very narrow straw fibers, when used in sufficient quantity with respect to other fibers present should result in considerably improved formation in writing, tablet, ledger, mimeo, and similar non-coated papers, and should also improve their printing characteristics. They warn, however, that such pulps should be processed and refined separately to develop the desired characteristics of each pulp to its optimum, and that they should be blended and mixed thoroughly before reaching the paper machine. Of very much interest is the fact that preliminary experiments under way at NRRL indicate that blending of more or less beaten straw pulp with unbeaten or only slightly beaten softwood sulfite produces papers which retain the desirable optimum characteristics of both types of fibers. That the equipment required for production of neutral sulfite wheat straw pulp is practically the same as that for alkaline pulping of wood has been demonstrated on a commercial scale in Holland.

What about costs: The NRRL study has this to say: "A rough calculation may be obtained from the raw material costs, using December 1947 prices. The figures are based on a yield of 50% of bleached pulp obtained with the use of 8% sodium sulfite plus 2.5% sodium carbonate (based on oven-dry straw) for pulping, and 7% total chlorine (based on oven-dry screened, unbleached pulp) for bleaching:

"Raw material requirements for producing 1 ton of air-dry bleached straw pulp:
Straw—4,000 lbs. at \$14.00..... \$28.00

Cooking chemicals

Na ₂ SO ₃ —288 lbs. at \$2.60/100 lbs.....	7.49
Na ₂ CO ₃ —91 lbs. at \$1.80/100 lbs.....	1.62

Unbleached, screened pulp—2,120 lbs. 53% yield)

Bleaching chemicals

Cl ₂ —161 lbs. at \$2.55/100 lbs.....	4.11
CaO—42 lbs. at \$10.00/ton.....	.21
Na ₂ SO ₃ —11 lbs. at \$2.60/100 lbs.....	.29
Na ₂ CO ₃ —11 lbs. at \$1.80/100 lbs.....	.20

Total raw materials \$41.92

"Multiplying the raw material cost by 2 to estimate the approximate cost of the manufactured product gives a value of \$83.84 as the manufacture cost of 1 ton of air-dry bleached wheat straw pulp produced by the sodium sulfite process."

Sufficient data have been presented by NRRL to show the technological and economic feasibility of producing high yields of wheat straw pulp for use in the production of fine papers. The essential raw material, straw, is produced annually in abundant supply, and there is no possibility of a scarcity of straw in the foreseeable future. The next logical step in this development is the making of a mill-scale trial run to determine the optimum conditions for preparing and handling the straw pulp on a production basis. The Northern Laboratory will help in every way possible in making such trial runs.

Utilization of Bagasse

The utilization of bagasse has been discussed in these pages on several occasions. E. C. Lathrop, head of the Agricultural Residues Division of NRRL, states that under normal world conditions about 20 million tons of bagasse re-



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sults annually from the manufacture of sugar cane. Thus far it is used mainly as fuel for steam and power in the sugar mills. But improved heat balance in the mills has resulted in some surplus of bagasse. Lathrop points out that interest again focuses on bagasse as a possibility in industrial utilization. He has no hesitancy in putting bagasse definitely into the sum total of "our national cellulose resources." He points to the bagasse hardboard industry which started in Louisiana in 1902 and now reaches a production of two million square feet daily in the U. S. This is in addition to similar industries in Australia, Cuba, and England. Japanese are said to have made insulating building board from bagasse in Formosa.

There has also been a very successful growth in the use of bagasse for plastics—for example, the production of resins for phonograph records. Much of the extensive experimental work on the utilization of bagasse has been directed to possible use in pulps for paper. A number of commercial plants have produced pulps from bagasse, but except for a small mill in Cuba, and a plant in Peru using bagasse as part of the furnish for wrapping papers, there is no reported production in consequence.

Dr. Lathrop does not feel that this is any indication of the true future of bagasse. A coarse paper for mulching has been produced commercially in Hawaii, and Dr. Lathrop states that "pulps properly prepared from the fibers of bagasse will be found especially suitable to the manufacture of book, writing, magazine, and other papers where good formation, opacity, and printability are required.

Pulping methods applied to bagasse may be soda, sulfate, neutral sodium sulfite, caustic soda and chlorine, and nitric acid processes. Each will produce slightly different characteristics, and yields will differ. Another variant will be the problem of chemical recovery and overall costs.

It has also been demonstrated that satisfactory chemical pulp for the manufacture of rayon or cellulose nitrate can be made from bagasse. Fifteen years ago Dr. Lathrop arranged for a shipment of Florida bagasse to a rayon mill. The company reported back that alpha-cellulose prepared by their method was satisfactory for rayon.

B. Franklin Stahl, chief chemist of the Terre Haute Paper Co., has made a study of 20 mills making pulp from several agricultural residues by the use of neutral sodium sulfite. Scarcely any two mills follows the same procedure of applying chemicals to the straw in the digester, although equipment is almost universally identical. Proportion of water to straw also varies greatly in different mills; some find that the pulp works off better in their refiners and runs better on the machine if diluted highly in the digester. Yet other mills tend toward keeping their pulp as dry as possible throughout the process.

Most of the mills queried by Mr. Stahl produce strawboard for the corrugating industry, although some have been pulping flax shives, old manila rope and other materials. Apparently, says Stahl, the only consistent phase of strawboard manufacture is at the refining stage.

Some mills are using the one-fill system—all straw, chemical and water being put into the digester at the start. Other mills range from two to four fills, back filling with straw and some even add more water and more chemical after the original loading.

Few strawboard mills seem to be beating to a spe-

cific standard of freeness; most depend on the judgment of an experienced hand. A couple of mills reported that sulfite stock washes more readily and makes for better freeness on the machine with resultant increases in machine speed and better driving. As to machine operations, Mr. Stahl reports as follows:

"In the 1946 experiments at Terre Haute the following cook was decided upon for a trial run; 1.25% sodium sulfite, 1.25% caustic soda and 4% lime based on the weight of the raw straw. Ten rotaries were cooked with this formula, 1800 gallons water used on 8400 pounds of straw and the cooks were made at 35 pound pressure for 8 hours after the second and final fill. This stock appeared to run 'wild' on the machines, necessitating a frequent change in the adjustments controlling the level of flow in the vats. Other than that there were no detrimental results.

At present the mills that are regular users of sodium sulfite apparently find that their best results are obtained by using only lime with the sulfite and there seems to be little benefit to be derived from adding a third chemical of any sort. The above-mentioned experimental cook costs \$1.35 per ton of raw straw. No productive runs have been made by other mills on a chemical cost as low as this and it appears that higher pressures would enable mills to make a good sulfite cook at this figure. Straight lime cooks, however, are still being made for costs of from \$1.00 to \$1.10 per ton of straw."

The increased cost (50 to 80 cents per ton of board) must be made up in other

ways. It is difficult to analyze savings in the beater-room power.

Mr. Stahl concludes from his questionnaire that there are definite indications that most of the regular users of sulfite have found better general running conditions. There is very little data that points toward detrimental results and yet there is very little in print to show a revolutionary effect in the use of neutral sodium sulfite on agricultural residues. There is fairly concrete evidence that a straight sulfite cook is prohibitive from a cost standpoint. The evidence gathered showed: higher costs than former lime or lime-caustic cooks, possibly higher yields, less liming of felts and wires, less shrinkage on dryers, better drying performance and less washing necessary.

Cotton Stalk and Boll

Tests at Herty Laboratory two years ago revealed that the cotton boll and stalk, taken together, could be used for paper. The catch was the gathering; avoidance of trash; consistency of annual supply. The use of machinery in the field may also solve this problem factor, reversing the situation in the crop straw fields of the middle west.

Giant bamboo, tried out at Savannah (U. S. Plant Introductory) Gardens, and afterwards successfully tried for acclimation over a wide range of mild weather states will at some time become a good domestic source for fine specialty paper material. This bamboo, according to Herty Laboratory, produces excellent grades of paper. Its growth and harvesting, once established in quantity, offers many ad-

vantages. There are a number of important interests who subsequently have obtained the necessary cuttings to start giant bamboo nurseries in the South.

A Mexican mill in Monterrey, visited by **PULP & PAPER**, is making bamboo pulp for paperboard for beer cases. The brewery owns the mill and grows its own giant bamboo and has bought seed from all over the world.

Bagasse, or sugar cane refuse, is well known as a major ingredient in the manufacture of Celotex at New Orleans. Another mill is in process of being financed. It will be erected by another company near New Iberia. Pilot plant tests of bagasse are being conducted at Louisiana State University for its use as paper.

Canadian Use of Flax

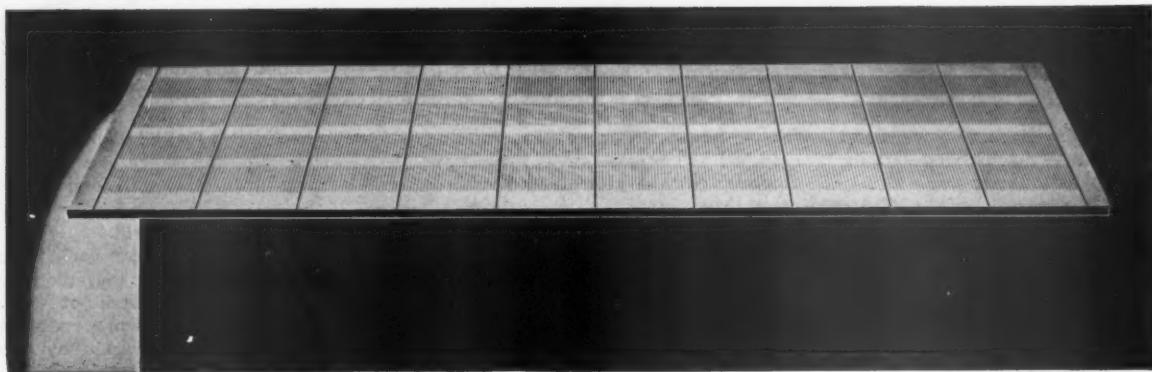
Canada's biggest user of flax in the manufacture of paper is Howard Smith Paper Mills, Ltd., at its Beauharnois, Que., plant. Before World War II no flax was used there, but when a shortage of rags for the fine paper processes became apparent during 1940 the mill turned to flax.

Two types of flax are grown in Canada, one being cultivated for its fiber which is spun into linen yarns for thread, sheets, twines, and so on. The other is used for production of flaxseed. Fibre flax has longer straw with fewer branches and is grown in Ontario and Quebec as well as in the Fraser valley of British Columbia. Most of the straw used by Howard Smith, however, is the seed type, which is purchased through the company's flax decorticating plant at Winnipeg. At Beauharnois the flax is unloaded in bales and

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cooked in a spherical rotary digester, washed, bleached and lapped.

Finished products of the Beauharnois mill are widely diversified, including bond and ledger paper, bank note, sulfite bonds and ledgers, chart and map papers, blue print, stationery, text papers, filter paper, pasted bristol, solid index bristols, cigarette paper, carbon, Bible paper and high grade specialties. The company's annual production of flax pulp at Beauharnois is about 1200 tons.

Flax pulp has been recently developed by Ecusta Paper Corp. in the U. S. used for airmail paper, bond specialties, etc.

When making pulp from various types of fiber, the yield from fiber to flax pulp ranges from 25 to 50 percent, depending on the type of raw material used, according to H. S. Spencer, manager of the Beauharnois mill. Most of the decorticated flax fiber is probably around the half-way mark. An extremely poor or dirty type of flax straw, having a high shive content, would probably yield less than 25%, whereas exceptionally clean flax could yield over 60%. These yields depend not only on the raw material itself, but on the method of washing.

Some of the earlier digesters were 14 feet in diameter, which held about 10,000 pounds of fiber, but more recently installations have been made 18 feet in diameter with a capacity of 20,000 pounds. Spherical digesters were found more satisfactory than horizontal rotaries. The digesters are well insulated and the pulp process may depend on direct or indirect steaming and the spherical digesters may

be rotated for part or all of the cooking cycle.

The chemical process in most mills using flax fiber is usually some variation of the kraft process with caustic soda and sulfur. In some mills the chemicals are added at a definite concentration and this is maintained constant throughout the cook by injection. This process is said to have definite advantages in facilitating control and making adjustments to suit variation in field retting of fiber, as much as 50% change in chemical strength being required for different grades of flax fiber on the market.

Other mills start with a maximum concentration, gradually reduced as the caustic is exhausted. After cooking and blowing of the digesters the stock is washed, usually in some form of washing machine, some having rolls for disintegration and shortening, others merely paddles for circulation.

There appears to be some difference of opinion as to where the stock should be cut, some mills cutting it in the wet form between the digester and washing, whereas others wash the stock free of chemicals and at the same time cut it short by means of the conventional type of beater roll incorporated as part of the washing machine. Others adopt the practice of not cutting the fiber, but leaving it full length until it gets to the beaters.

After washing, most mills chlorinate at a low pH, after which bleaching is carried on in washers or separately. Other mills add a large excess of chlorine and neutralize the excess and thereby do not need to use hydrochlorite liquor.

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